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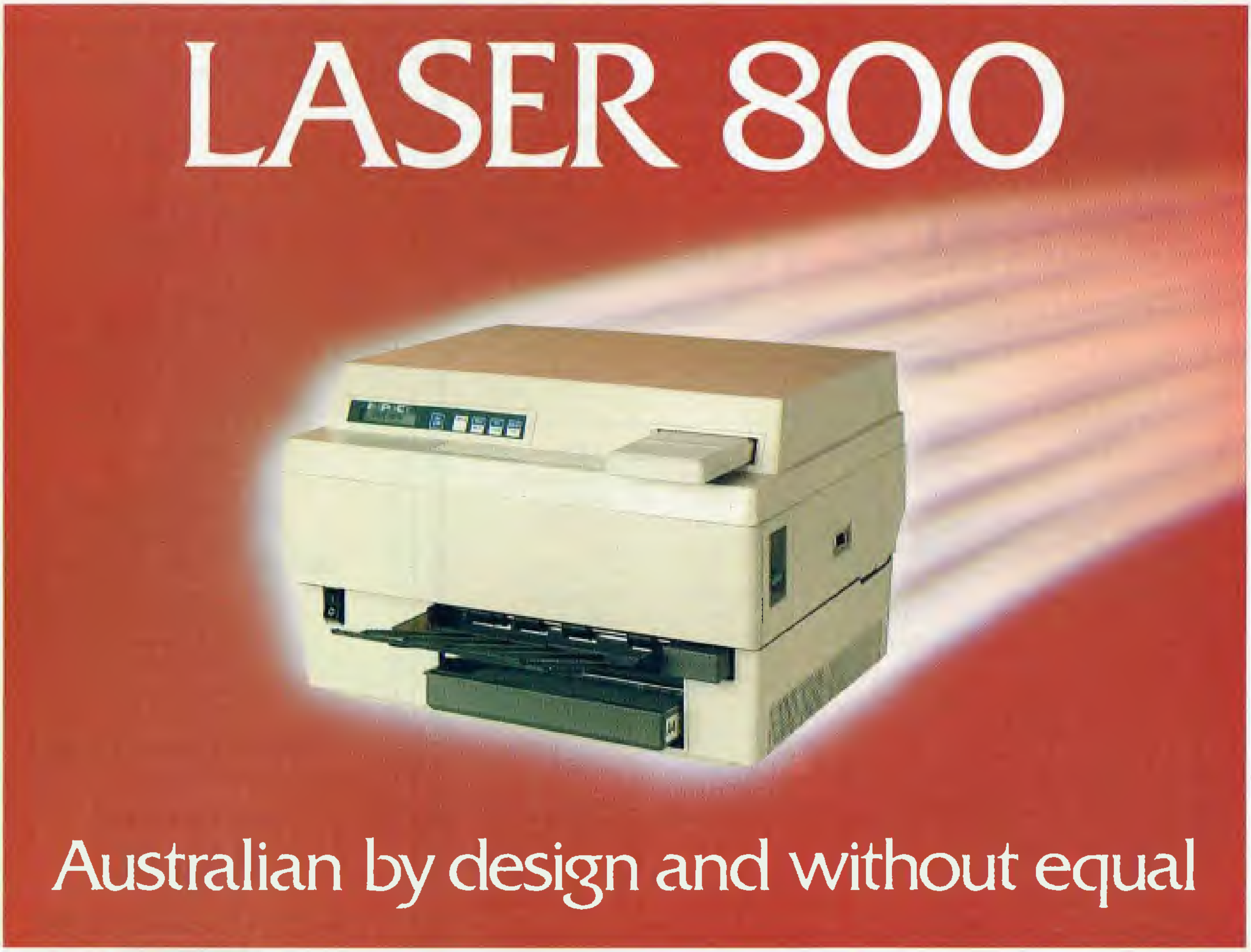

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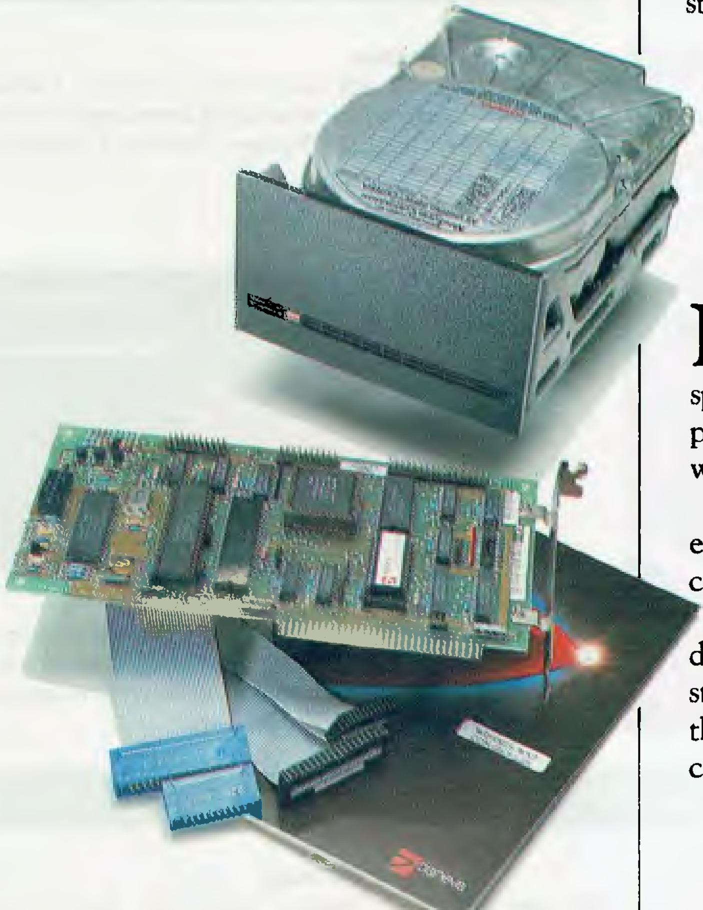

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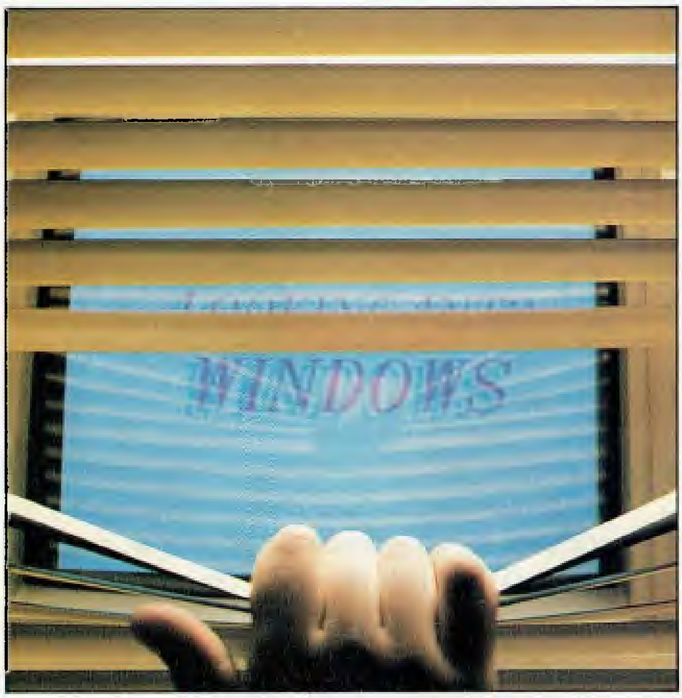

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Now that the final link in IBM's PC-mini-mainframe networking chain has at last been announced, it is an appropriate time to venture up-market and examine the company's distributed office (DISOSS) environment.
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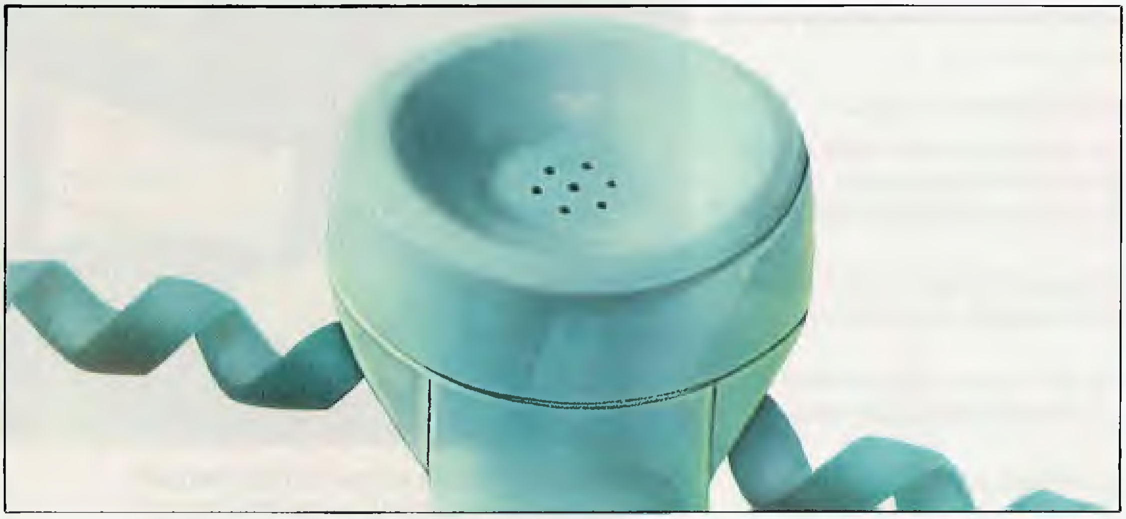

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Vi Adelle reports on the *PC Australia* videotex bulletin board service, now residing in Viatel and growing in size.

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the next issue of *PC Australia* coincides with the Videotex 86 exhibition in Sydney, so the main feature, is — you guessed it — videotex on the PC.

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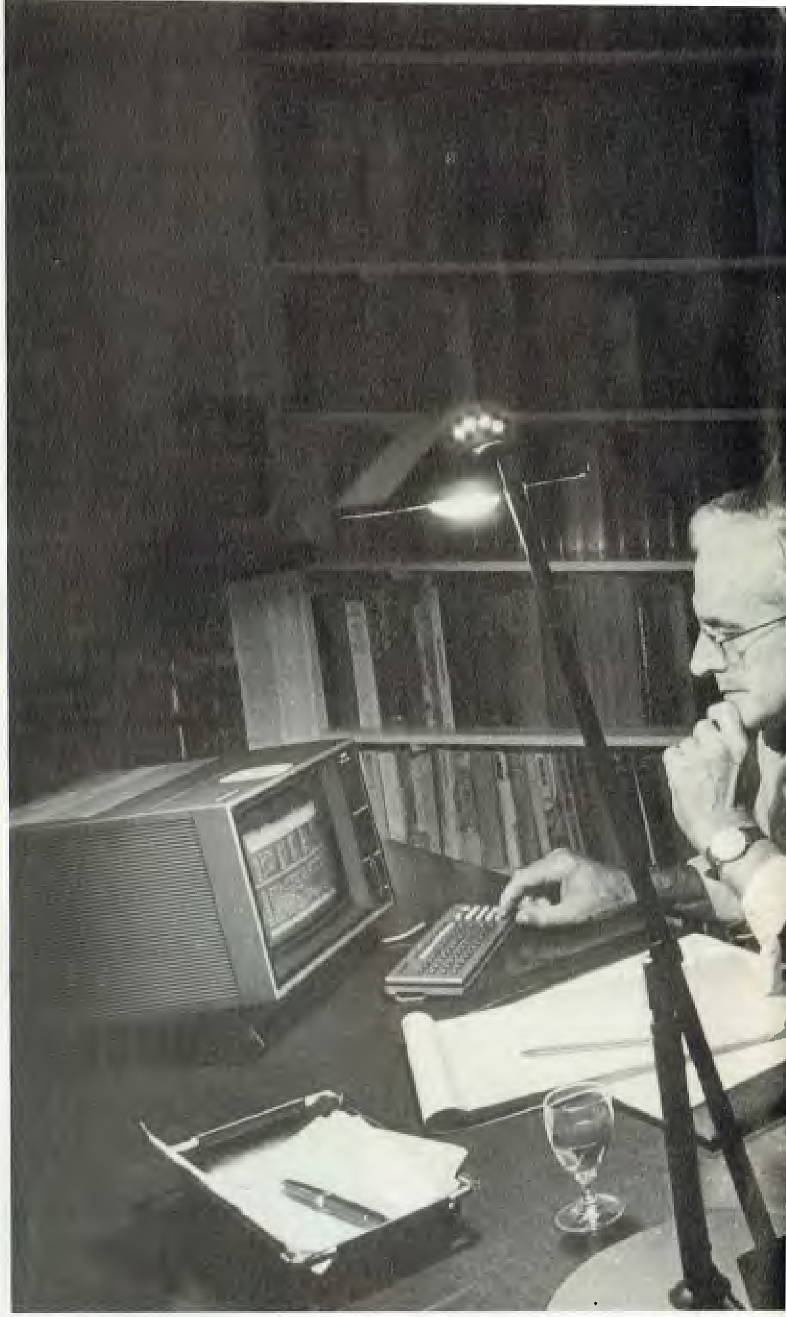
Les Stein reveals the reasoning behind his 'play now — die later' PC product acquisition philosophy. If you have any money, do not read this article!



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Questions, questions

Well, in just over six months we have hit our target of 15,000 *PC Australia* readers. Once the celebrations have subsided, phase two of our marketing plan will begin and we will change focus slightly, so that instead of seeking more *PC Australia* readers, we will concentrate on delivering to our existing readership more of the sort of material they like. For this reason all *PC Australia* subscribers will receive a comprehensive questionnaire with this issue and I urge you all to complete it in detail.

We want to know which articles and departments you particularly like or dislike, how *PC Australia* helps you in your work and keeps you up with the latest developments, and which direction you would like to see us move in the future. Response is vital if we are to maintain our role as Australia's only interactive IBM PC and compatibles guide, and you can expect further 'interaction' of this kind as time goes by.

It has been suggested that we modify our title line to "The Innovative IBM PC and Compatibles Guide", in recognition of the innovations *PC Australia* has introduced, many of which have been imitated by other publications. These include the overwhelmingly successful PC Listing Disks (PC Disk #3 is unveiled in this issue), the *PC Australia* videotex bulletin board, the Videotex Page, PC Essay, BBS File, and PC Top Ten software products of the month, the PC Bulletin board pages, and our innovative front covers. Nevertheless, we will not be changing our title line because I still believe that interactivity is the key to *PC Australia's* success.

Since *PC Australia's* launch last October we have been receiving between 2000 and 3000 subscription applications a month, and we expect a waiting list to build up of many unfortunate PC users who missed out on their free subscription to *PC Australia.* For their sake we will be closely scrutinising our mailing list with an eye to purging it whenever possible and allowing people on the waiting list to become one of the lucky 15,000.

If you (or your office) receive more than one copy of *PC Australia,* you can help the people on the waiting list by telling our circulation department (03) 67 8020. We are keen to get *PC Australia* out to the maximum number of readers, but to keep it a free magazine we must limit the monthly print run. Already we have run out of copies of the January edition so if you have an incomplete set, it may be well worth your while to go straight to page 74 (do not pass Go) and order any back issues to fill the gaps in your collection.

We still have stocks of our first issue, released in October 1985, and you may consider it worthwhile to have another copy, bearing in mind that a copy of the very first Superman comic was recently bought at an auction in New York for more than one million dollars.

Anyway, those of you on the mailing list can heave a sigh of relief, read this issue from cover to cover, then complete the enclosed reader survey. Mail it in the (postage paid) envelope enclosed, and look forward to future issues, which will even more closely conform to your personal and business requirements. You probably use a customised PC system with customised software, so why not read a customised magazine?

As *PC Australia* is primarily designed as a reference journal rather than a news publication, it never really goes out of date. Back issues can be just as useful to you today as the day they arrived, unlike a newspaper, which is destined for the rubbish bin the moment the next one appears.

For this reason we will soon be offering *PC Australia* binders, giving you somewhere to house your valued collection, and providing extra protection.

Furthermore, as Vi Adelle explains in her column an online index to all past issues of *PC Australia* is gradually taking shape on our videotex bulletin board service. This index will complement your *PC Australia* library making it even easier to locate that particular item of interest.

Already, I am beginning to lose track of which features were covered in which issue, so it seems an appropriate time to get an index organised for *PC Australia.*

I am pleased to say that the majority of mail to *PC Australia* now arrives through Viatel rather than the traditional post, and it is reassuring to see so many readers embracing the new technology.

The *PC Australia* Viatel mailbox number 360241220 can be used to contact me or any of the magazine staff, so if you have not used electronic mail before, jump to page number *1010# and give it a try. ■

GUEST EDITORIAL • STEWART ALSOP and CHARLES BERMANT

Baring the soul

The PC software industry is going bare and it is not gathering on a nude beach. Rather, more and more software companies are removing copy protection from their major products.

Microsoft Corp. quietly dropped copy protection from *Access*, *Project*, *Multiplan*, and *Microsoft Chart* over the past six months and more recently from its only remaining protected PC-DOS program, *Microsoft Word*. Software Publishing Corp. says it will drop copy protection from all future new products in its *PFS* and *Harvard* software lines. "It's an ease-of-use issue," says Kim Domino, spokesperson for Software Publishing. "Corporations have requested removal of copy protection, not to violate the law but to make backup copies."

The moves by Microsoft and Software Publishing to drop copy protection leave just two of the top ten business-software publishers — Lotus Development corp. and Ashton-Tate — selling copy-protected software.

Beyond the top ten, some other companies use copy protection selectively. Living Videotext for example, still protects its *Think Tank* outlining program but offers customers an unlocking program and plans to remove protection with the next major upgrade.

What happened to copy protection? In a word, corporations. While individual and small-business users have been complaining about copy-protected programs ever since personal computers came on the market, they lacked the clout to persuade publishers that going bare was in everyone's best interests. Corporations, on the other hand, are now estimated to buy as much as 40 per cent of the business software sold. They buy hundreds of copies at a time and they don't like to fiddle with copy-protection schemes, particularly with the advent of hard disks and networks. Protected software installed on a hard disk often cannot be used after a routine tape backup.

Along with pressure from big corporate customers, publishers are also beginning to believe users understand the legal issues involved. "More people realise that it's not right to copy software and give it to someone else," says Signe Ostby, product marketing manager for Software Publishing. "People understand what is piracy and what isn't. They want to be legal."

It is customer pressure, then, that is bringing copy protection to its knees. "Copy protection will soon be one of those things like CP/M, where newcomers will wonder what you're talking about," says Gordon Eubanks, chairman of Symantec Corp. in California, which publishes the unprotected and best selling *Q&A* database and word processor. have been less impressive for the other two, *Paradox* (protected, then unprotected in Version 1.1) and *Javelin* (protected).

Indeed, Michael Brown, founder and president of Central Point Software, is getting ready to move his company out of selling software that copies protected programs. Brown says *Copy II PC*, his company's lead product, is still setting sales records, "But the customer base will force software publishers to drop copy protection," Brown says. "Corporate and government accounts will no longer accept it. With increased use of tape backups and networks, it becomes too much of an inconvenience."

Copy protection will not die overnight. The two largest sellers of PC applications are still committed, for now, to protecting their products. Through a spokesperson, Lotus Development Corp. says that it is studying the issue carefully but has no plans to remove copy protection from its products in the near future.

Ashton-Tate, on the other hand, says that copy protection, is the number-one issue for its corporate customers. "It corresponds to the increasing use of hard disks and networks," says the company's president Ed Esber. Ashton-Tate is now considering removing the protection from *Framework II*, its integrated productivity package, as an experiment.

There are some areas where software publishers continue to feel justified in protecting their products. Joe Diodati, vice president of marketing for Softguard Systems in California, the leading vendor of copy-protection systems (the one used by Ashton-Tate and Lotus) admits copy protection "is probably dying" but maintains that specialised software still needs to be protected because the potential market is so small. Widespread copying of a specialised application could ruin the developer.

Bruce Grant, chief of technical support for Microage Computer Stores in Arizona agrees. He does not believe that copy protection will ever die completely. Instead, he says that new vendors with niche-market applications should copy-protect them, while publishers of a low-end word processor or spreadsheet should not. Publishers of entertainment and educational software also feel justified in protecting their programs.

The death of copy protection really began in 1983, with the arrival of Borland International which turned unprotected programs into a marketing advantage by selling the unprotected version of *SideKick* for $30 more than the protected version. The success of the more-expensive, unprotected version demonstrated that it was possible to build a healthy and profitable business selling software that is unprotected. ■

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Mail overload

It seems that *PC Australia* readers are a responsive lot. Conventional and electronic mail pours in to reveal the wide range of issues which concern the PC user community. Here are some of the more recent offerings.

Identical Serial Numbers?

I am writing to you regarding your article on software security (PC Australia, April 86), and an experience I had regarding 'software pirating'.

I recently purchased the Infocom adventure game, '*Hitch-Hikers' Guide to the Galaxy*', from a mail-order firm in WA. While waiting for it to arrive I was offered a copy of the same program by a friend. I accepted as I could see nothing wrong since I was buying an original. Imagine my shock when I finally booted up my brand new disk to discover that the serial number and release number were exactly the same as those on my friend's copy!

If the manufacturers were really serious about copy-protecting their products by embedding serial numbers on the disks, you'd think that they would at least change them for each individual disk.

This is not an isolated case, but an example of what goes on in the games software field. I cannot say whether this occurs with business software, as I am not really in a position to examine identical packages of popular software.

I agree in part with a company's right to protect its investment, but I cannot see how an individual user can justify the expense of purchasing some of these copy-protected programs when they are not receiving bona fide individualised packages.

Stuart McMinn
Airport West, Vic.

Amazing! I had always assumed software companies which added serial numbers to their products would at least make sure to add a different one to each disk — after all, the additional programming would be dead easy. All I can surmise is that a little time might be saved by mass duplication of disks. I certainly intend to go through my own software collection so that I can compare serial numbers with friends and user group members, because Stuart is absolutely correct about the pointless exercise he described. I would be interested to know if any other readers have had similar experiences with legitimately purchased original software.— Ed.

Terminal emulation responses

The article by Roger Addelson on Terminal Emulation (PC Australia April) is timely. As distributors of the Forte Communications range, we are experiencing extraordinary demand.

However, the article contains some inaccuracies. The Forte PJ allows a PC to emulate the IBM 3278 terminal Models 2, 3 and 4, but also Model 5 — which your writer neglected to mention. Emulating Model 5, the Forte PJ will generate a 132-column screen image (which requires a special graphic adaptor, such as that produced by Tseng Laboratories). The article also omitted to mention that the Forte PJ supports a light pen and is compatible with the latest release of Tempus Link software.

In claiming that the Attachmate 3-N-1 adapter offers "the most versatile emulation boards," Addelson runs into dangerous territory. Our view is that the Forte range can do everything the Attachmate does — plus a great deal more — including the ability to download mainframe graphics. We also understand that Attachmate does not have full support for a 3270 keyboard, and that Attachmate's emulation of the 3270 PC is far less complete than Forte's emulation.

Addelson's comment that 'IRMA is the only product to provide full light pen support' is wrong. Forte PJ supports FTG light pen standards. IRMA also lacks mainframe graphics capability. The article was in all other respects a very fair and comprehensive piece.

Arnold Roth
Managing director, SCA
South Melbourne, Vic.

Ian RomChip?

Am I the only one who noticed? To write articles for PC Australia, it seems an author must have a computer-related name. My strine is sufficiently fluent to recognise the *WordStar* article (April PC Essay) authors, Mel Murch and Ward Starr, as being MailMerge and *WordStar*. Further on, the report on Viatel penned by Vi Adelle and then the Guest Editorial by Bill Monochrome.

Where will it all end? Should David Small ("The Futility of Copy Protection") have been David Micro? And is Ian Robinson really Ian RomChip? I hope not. It's all a bit much?

Bruce Kirkham
Clayton, Vic.

I must congratulate you on having the sharp eyes to pick up our April Fools Day article on WordStar. Vi Adelle insists on maintaining a shroud of secrecy so she can continue to investigate various online services without detection, but as for David Small, Bill Machrone and Ian Robinson — I assure you they are all real names. Ian RomChip indeed! — Ed

A word from New Zealand

Congratulations! What a surprise to receive the March issue of a computer magazine actually in March, instead of at least three months later. And what's more, I can understand most of the articles.

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I am a fairly naive PC user, rather than a dyed-in-the-wool programmer or DP professional, and it is a real pleasure to feel at home with the language and context of your features. I use an IBM PC with *WordStar*, *Lotus 1-2-3* and *dBase III* as my main software packages.

I use an IBM Proprinter and I believe it can produce a variety of fonts, but I have not yet come across any information on how this is done. If you can point me in the direction of any suitable publication explaining the functions of this printer, I will be most obliged.

Don Elder
Auckland, NZ

Glad you like the magazine — it is good to hear that the PC community is alive and well in New Zealand. As for the Proprinter, I am surprised that details of font variations were not included in the printer manual. Alternative fonts are generated by a sequence of special 'control codes' sent to the printer, and unfortunately IBM has chosen (as usual) to design its Proprinter with a different set of control codes to everybody else. Try your PC dealer, who should have provided you with an appropriate manual in the first place. — Ed

Hacker spirit returns

I have just read Les Stein's rather encouraging article, 'Hacker City magic' in the April issue of PC Australia. It comes at a time when I have the 'end user blues', which have been further compounded because I used to be a hacker myself (using HP 9830s etc) and made many discoveries, despite a lack of experience.

This article has encouraged me to get back into the leading edge and enjoy it. The trouble was that I had become too sensitive by the lack of an apparent 'finished' software product. Many thanks.

Dr Ian Murdoch
Aberfoyle Park, SA

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PC AUSTRALIA News

Wangaratta increases sophistication

IBM has taken its Wangaratta-based PC assembly operation one step further and begun manufacturing PC XT motherboards. The company has invested $3.7 million in new equipment at Wangaratta, which was originally established in 1976 to make Selectric typewriters.

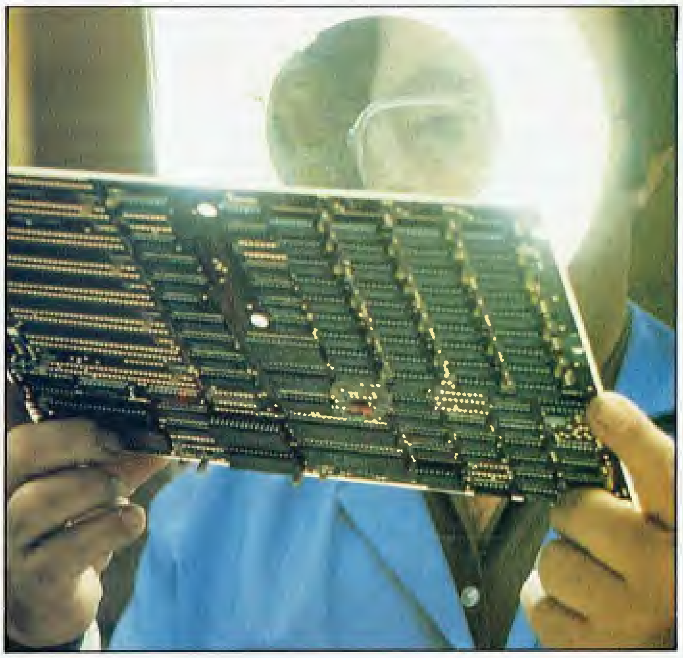
The upgraded PC assembly line consists of separate assembly and test stages. It covers 465 square metres and includes automatic component insertion, wave soldering and board testing equipment. Most components are inserted into motherboards automatically, although a few still have to be installed by hand.

Empty (or 'raw') circuit boards and components are gathered in a central area before being released to the production line where an axial lead sequencer places components in the correct order at a rate of 18,000 an hour. The raw boards pass through three auto-insertion machines — a module inserter (for ICs), an axial lead inserter (resistors and diodes) and a radial lead inserter (capacitors) — all of which operate to an accuracy of 50 micrometres, or two thousandths of an inch.

Solder connections are made in a wave solder and aqueous cleaner just over 12m long. The boards move on a conveyor belt through a fluxer, pre-heater and solder-pot. The aqueous cleaner washes away flux, protective tape and any other contaminants, using de-ionised water at 70 degrees Celsius. After this, components which must be kept dry are soldered and the boards go to be tested.

The test area consists of four stations. The first is a line tester designed to detect assembly faults such as bent pins, solder defects and misaligned components. Then boards are stacked onto trays and subjected to a 12-hour burn in, through a range of temperatures from zero to 70 degrees Celsius, all controlled by a specially-modified IBM PC. The next stage is a system tester which subjects each board to a range of high and low voltage conditions. If any board fails any test stage, the entire batch is sent back.

Since all the new equipment is computer-controlled, it is a relatively painless operation to reprogram it for manufacturing something other than PC XT motherboards and plans are underway to configure the new assembly line for PC AT motherboards in the near future. It will also be relatively simple to accommodate future IBM products including the recently-announced Rolm Communication Controllers.



Although IBM's Wangaratta operation is, without doubt, the junior of the company's three PC assembly plants (the others are in the US at Boca Raton, Florida and in Greenock in Scotland), the new investment puts the local plant in a much better position for the future, considering that IBM is using Australia as a base for future penetration into the lucrative south-east Asian market.

PC AUSTRALIA TOP TEN

1.	**1-2-3**	— *Lotus Development Corp.*
2.	**DisplayWrite 3**	— *IBM*
3.	**Word**	— *Microsoft*
4.	**dBase III Plus**	— *Ashton-Tate*
5.	**Multiplan**	— *Microsoft*
6.	**Word Perfect**	— *SSI*
7.	**WordStar**	— *Micropro*
8.	**Multimate**	— *Multimate International*
9.	**Open Access**	— *Software Publishing Inter.*
10.	**CBA**	— *Intelligence*

The PC Australia Top Ten is derived from monthly surveys of over 240 PC software outlets by Focus Research.

IBM Australia introduces RT PC

IBM Australia has wasted no time in bringing the high-speed RT Personal Computer line to the local market, following its release in the US. RT stands for 'RISC Technology', a concept which IBM claims to have invented.

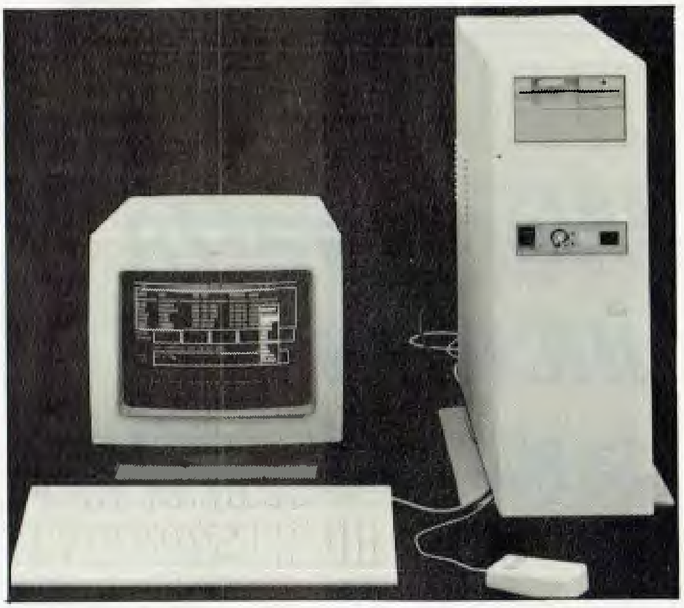
RISC (reduced instruction set computer) architecture involves streamlining a microprocessor's instruction set to the bare minimum of operations, most of which are executed in a single machine cycle (170 billionths of a second), such as add, subtract, shift and compare. Fewer instructions lead to a shorter search time and faster execution, which is why IBM has targeted the RT range specifically at the engineering and scientific market. IBM claims that the RT workstations (including one AT-like desktop model and three floor-standing versions) are the company's first standalone products intended to perform major CAD/CAM and computer-aided engineering (CAE) tasks, such as automobile and electronic circuit design.

The RT machines are based on a proprietary IBM 32-bit RISC microprocessor and memory management unit (MMU) chip. They use a new Unix-inspired multi-user, multitasking IBM operating system known as Advanced Interactive Executive, or AIX. IBM claims that eight users — seven on external terminals and one on the RT console — can work simultaneously "without concern about the size of their program or memory".

The RT's 23MHz clock speed must be slowed to 6MHz when the plug-in 80286 AT-compatibility option is used. The coprocessor option allows existing PC programs to run concurrently with RT PC programs, and RT PC disk files and peripherals may be shared.

Initially, nine application packages are available from IBM for the RT PC, including IBM's first integrated circuit design program. Other new software includes technical drawing packages, text editors, spreadsheets and databases. In addition, traditional third-party PC software developers claim to have several RT products in the pipeline, including versions of AutoCAD and *Samna Word III*.

RT PCs may also be fitted with mainframe-type all-points-addressable (APA) display graphics options and IBM backup tape drives as used with the System/36. Floor-standing RT PCs can also be configured as hosts for the IBM 5080 graphics system, previously confined to mainframes. As might be expected of a new high-end system, prices also set a new high point. A basic system starts at around $30,000, rising to $42,000 for a floor-standing model and way beyond, when various additional options and software are taken into account.



The new 'RISC Technology' from IBM

Barson continues towards PC compatibility

Barson's PC clone: the Tandon PCX

As predicted in the March issue of PC Australia, Barson Computer Australasia has followed up the release of the AT-compatible Xen system with a fully-compatible PC clone.

The Tandon family of five PC compatibles, ranging from the base model PCX to the top of the range PCA, was developed in the United States for disk drive manufacturer, Tandon Corporation, by microcomputer designer Chuck Peddle (of Pet, Sirius and Vic 20 fame). Based on Tandon's recently-improved Winchester drive technology, the Tandon PCs were launched on the European market late last year.

The Tandon PCX, starting at $2426 (excluding tax) is available with 256K, seven PC-compatible expansion slots, two 360K floppy disks, or with a 10M or 20M hard disk. The Tandon PCA is an AT-compatible system with a switchable (6/8MHz) clock speed, eight expansion slots and either a 20M or 30M hard disk. The latter version is aggressively priced at $7076 (excluding tax).

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New PC keyboard on the way

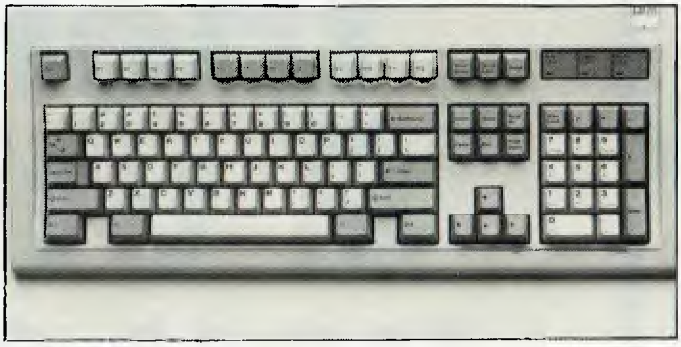
The recent launch of IBM's PC Convertible laptop overshadowed many other announcements which would have normally dominated the headlines. Among them were IBM's 8M Hz PC AT, TopView 1.1, half-height disk drives and a 20M hard disk for the PC XT, and the unceremonious dumping of the old IBM PC Portable — often scathingly referred to as 'IBM's Compaq clone'.

But the announcement which escaped most headlines, yet which perhaps has the broadest implications for all PC users, was the release of IBM's Enhanced PC keyboard. Otherwise known as the PC RT keyboard it is intended to be the standard keyboard of the future for all IBM product lines. The 101-key device is a move back towards the famous IBM Selectric keyboard which dominated the typewriter industry for so long and which many observers had hoped would be part of the original IBM PC.

The new keyboard is different to those on the PC and the PC AT and American buyers can choose it instead of the 83-key PC keyboard or the 84-key AT keyboard. However according to IBM, the new keyboard cannot be fitted to existing PC or AT models.

Users of many popular PC software packages which provide function key templates will be dismayed to learn that the new keyboard provides twelve function across the top rather than ten clustered on the left. Other changes include a relocated control key (extreme lower left hand side), altered shift, tab, backspace, CapsLock and directional (arrow) keys.

On the other hand, avid spreadsheet users will be pleased to learn that the arrow keys have been separated from the numeric keypad. Other changes include NumLock, CapsLock and ScrollLock LED indicators in the top right hand corner, separate word processing key block (PgUp, PgDn) and larger shift, control and backspace keys.



The new keyboard which IBM says cannot be fitted to existing PC or AT models. The 101 key device is a move back to the IBM Selectric keyboard

Sourceware wins Javelin

Adding yet another Australian distributor to its list, US software giant Ashton-Tate has appointed Sourceware as master distributor of *Javelin*, a financial modelling, business analysis and reporting package from Javelin Software Corporation. Ashton-Tate has secured the worldwide distribution rights for *Javelin*, under an exclusive marketing arrangement. The parent company will still service the home (US and Canada) markets, but has acknowledged Ashton-Tate's international marketing successes by turning over all other markets to it.

Javelin is claimed to have been designed to fill the gap between current spreadsheets and financial modelling packages, and supposedly offers the benefits of reduced time to obtain a solution, speedy validation of work calculated, and the ability to clearly communicate the results obtained. Rather than building upon the standard two-dimensional spreadsheet model (as many other 'new' products have done). *Javelin* is built around a 'central information base', which can be analysed through any of ten different views, including a table view, formula view, graphical view or worksheet view and it fully understands time.

Three case study disks supplement *Javelin*'s tutorial material, and part of the distribution deal with Sourceware involves application support from Ron Pollak & Co, a Sydney-based consultancy.

SNS introduces Leading Edge

Telephone hotline support is being provided for this Leading Edge Model D PC

A low-cost PC compatible which has enjoyed more success than most in the aggressive US market has now reached Australia. The Korean-built highly-compatible Leading Edge Model D is being distributed by the SNS Group, which intends to secure 10 per cent of total PC sales in Australia.

This target may prove to be difficult, given that Leading Edge costs $2995 (compared to Taiwanese compatibles at under $1500), although the model D comes with a high-resolution monochrome monitor and Hercules graphics emulation. Other standard features include 256K RAM (expandable to 640K on the motherboard), two half-height disk drives and a serial an parallel port. Options include a 20M hard disk.

MicroHelp introduces
the Ultimate in Dot-Matrix Printers

FUJITSU DPL-24

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Fujitsu's 24-wire dot matrix printer provides excellent letter quality print.

The Fujitsu DPL24 has a unique 24-wire print head and offers excellent letter quality print at 96 cps. High speed draft quality is also possible at 288 cps. Sharp graphics prints come out at 34,560 dots per second. Language selection (8 languages), word processing and bit-image functions are provided as standard features. Up to seven type fonts are selectable with optional font cartridges. Continuous forms are automatically loaded and unloaded, and cut sheets are autoloaded. Wider cut sheets of up to 420mm (16.5 in) wide are usable. Reliability is superb, and the integrated self-diagnostic functions make maintenance a snap. Centronics and RS 232C interfaces are switchable. The Model D is equivalent to Diablo 630 API and the Model I is equivalent to IBM graphics printer. Both models are compatible with IBM personal computers.

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Technical Data - HR31 200

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Retrace Time (H x V):	0.5Ms x 0.4msec
Resolution:	640 x 200 lines
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Dimensions:	11"(H) x 15"(W) x 13 (D) 266(H) x 367(W) x 318(D)mm
Shipping Weight:	15.9kg

Model HR31

Models HR 39 & HR 134

Technical Data - HR 39 & HR 134

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Phosphor:	HR 39 (Green) HR 134 (Amber)
Sync H. Scan Frequency:	18.432kHz
V. Scan Frequency:	50/60Hz
Signal Input:	Video - TTL Level Positive Sync H - TTL Level Positive Sync V - TTL Level Negative
Video Response:	20MHz
Display Size (H x V):	203mm x 135mm
Display Time (H x V):	44Ms x 18.99msec
Resolution:	Centre 1,000 lines Corner 800 lines
Display Formats:	9 x 14 matrix, 2000 characters in 80 x 25 format
Input Terminals:	9 pin "D" type connector
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Wang APC

Impressive performance is the best description for Wang's new Advanced Professional Computer (or APC, but not to be confused with NEC's offering). Far from portable (the 8-slot system unit weighs just on 14 kg), this is a most presentable desktop PC with separate keyboard and monitor. Although different in many respects from the IBM PC, there is an IBM emulation option which provides a high degree of compatibility.

The APC is faster than the original 8086-based Wang PC and has additional features. The APC uses the 80286 CPU and both the Wang PC and APC run at 8 MHz. Wang PCs can be upgraded to APC level with a single board exchange.

Two operating modes are supported. The APC may be used as a single-user standalone system under MS-DOS with roughly twice the speed of the Wang PC or IBM XT. As a multi-user, multi-tasking system, the APC runs under Microsoft's Xenix operating system, supporting up to four workstations. Extensive communication capabilities including SNA gateways and 3270 emulation are available under both modes.

There are four preconfigured base systems, ranging in price from $6050 to $15,530. All contain 512K RAM (using Wang SIMM chips) as standard, expandable to 768K. The low-end APC-S1 has a 5-slot chassis and a single half-height 360K floppy disk drive. All of the remaining units use the 8-slot chassis. The XAPC-S1 replaces the 360K drive with a 1.2M drive. The XAPC-S2 adds a 20M Winchester drive and controller, while the high end XAPC-S3 uses a 67M Winchester.

The review unit was a variation of the XAPC-S2 with a 360K floppy drive (for PC compatibility) and a 30M Winchester (with a PM029 controller) plus green screen monitor with IBM monochrome emulation. Although equipped with Wang word processing software, I chose to test the unit strictly as a PC compatible under IBM emulation mode. This article was typed using *WordStar 3.3* as an operational test. As is to be expected from Wang, the performance is first class. Characters are crisp, the screen is ergonomically suspended at a convenient height from an optional arm, and the keyboard is relatively easy to use after making minor mental allowances for the differences in layout. In particular, I found it hard to find the control and Alt keys which are well removed from their 'normal' IBM positions. A separate cursor pad between the main keys and the numeric keypad adds just a few more centimetres to the right of the keyboard — a potential problem for a typist accustomed to placing documents on that side.

With the optional monitor arm and desk clamp, the Wang APC's screen can be positioned where the user wants it

In spite of the extra keypad the keyboard is only marginally larger than that of the PC since the 16 function keys are on the top row. All the IBM PC keys are represented (albeit in odd locations) and there are additional keys for strictly Wang mode usage. The review unit had

The system unit can be clamped to the side of a desk, or free standing

special keytops with IBM legends (appropriately in blue) as alternatives to the black Wang legends. Keyboard rake is adjustable using retractable legs. A generous coiled keyboard cable allows the system unit to be put on the floor beside or under a desk.

A minor annoyance was the inability to suppress or at least quieten the speaker-generated key clicks, in spite of there being a utility to perform this function in Wang mode. The CapsLock key carries an LED indicator and the keyboard includes five more programmable indicators. The F16 key doubles as a NumLock key, with a corresponding indicator, but this does not match the IBM function key overlay provided. The Cancel key doubles up as the Scroll Lock/Break, but without an indicator. In IBM emulation you have the choice of no less than three separate return keys! Compatibility extends to the ability to perform the standard three-key soft boot restart when in emulation mode.

The system unit is a bulky 59 by 38 by 24cm. It is designed to be placed on its side with the floppy drive mounted vertically above the hard disk. In this position it is quite convenient and can be unobtrusively put on the floor. Internally, there is little resemblance to the IBM PC. The cards are totally different.

The review unit sported one serial and one parallel port. Unfortunately, the parallel port is the standard Centronics style of socket rather than the 25-pin connector espoused by IBM. Unfortunate, since I do not have the cable (once considered standard) necessary to link it to my printer.

One of the acid tests of compatibility is Microsoft's *Flight Simulator* but alas, my copy would not run. According to the Wang documentation, *Flight Simulator* should run, so I guess that my version requires the optional IBM-compatible color card. Nevertheless it did run *WordStar 3.3* (ported via floppy disk), *SideKick* and the *Stylus* program editor, each of which require a high degree of hardware compatibility.

Among the list of software packages which Wang claims will run correctly on the APC in IBM emulation mode are *SideKick 1.11c*, *Harvard Project Manager 1.1*, *Displaywrite*, *Easywriter II*, *Volkswriter*, *Lotus 1-2-3*, *Symphony*, *Knowledgeman*, *WordStar*, *Multiplan*, *PFS:file*, *Open Access* and *Supercalc III.* Software known not to run in emulation mode includes *Microsoft Word*, *Multimate*, *R:base 4000* and *PFS:write.*

Well-behaved or 'generic' software also runs in both IBM and Wang modes. In particular, I was able to conduct the benchmark tests in both modes using the same software tools (DRI's PL/I-86 and LINK86). As can be seen from the report card the APC is an extremely fast engine. As part of the review I used the machine in the development of a new program written in C. On my regular PC clone, the compilation and linkage process took over six minutes each time. With the Wang (in IBM emulation), it took just over a minute.

It is also interesting to note that IBM emulation actually slows down performance marginally, due I imagine, to the additional layer of 'intercepting' software and the difference in BIOS approaches.

Options include a 5 MHz 80287 numeric coprocessor and a variety of option boards including memory and port expansion. The manuals provided are first class. Although bound in an austere 'Spirax' style, they are lucid and contain a wealth of information. The review unit arrived with seven manuals plus a number of smaller booklets designed for all users from novice to expert. Full marks.

The APC addresses two different market segments: the high-performance PC market and the small business systems market. It is distributed through both direct and indirect sales organisations in Australia. Direct sales are aimed at Wang's installed base concentrating on the networking capabilities. The indirect sales are generally directed towards small business and third party solutions. Wang offers an extensive warranty and custom service arrangements. ■

WANG APC

Australian Distributor
Wang Computer Pty Ltd
168 Walker Street
North Sydney 2060

Basic Configuration

Processor:	80286-2
Clock Speed:	8MHz
Total RAM:	512K (768K maximum)
Ports:	1 Parallel, 1 Serial
Display Screen:	Green screen or RGB
Disk drives:	5.25in floppy, 30M hard disk
Operating System:	S-DOS 2.11

Benchmark Speeds (IBM-PC = 10)

	IBM Emulation Mode	Wang MS-DOS Mode
CPU-bound	41	56
Floppy disk-bound	12.2	14.4
Hard disk-bound	27	36.5

Ratings 0 (Awful) to 5 (Excellent)

Hardware Compatibility:	3.0
Software Compatibility:	3.8
Value for money:	4.5
Documentation:	5.0
Vendor Support:	5.0
Maintainability:	4.5

Best points: Speed, engineering quality, documentation

Minor gripes: Keyboard layout

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WINDOWS

Looking into windows

Les Stein — ever ready to stick his neck out — takes a look through four windows to see if he can spot tomorrow's standard in today's offerings

A fad often becomes a necessity. The latest to grip the attention of the personal computer world are programs which allow diverse applications to pop up and execute concurrently in different screen 'windows'. In the past few months, three 'start-up' companies have jumped on the bandwagon with wondrous claims. The result is 13 different windowing programs and there is confusion in the industry as to which ones will become standards.

In Australia, four packages share the limelight. IBM's *TopView*, Microsoft's *Windows, GEM Desktop* from good old Digital Research, and the lesser-known Quarterdeck *DESQview.*

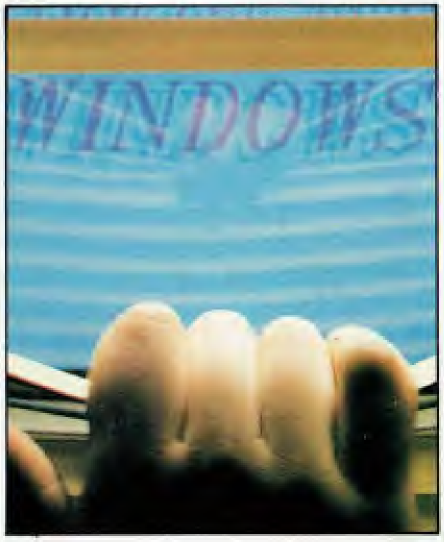
There has been great speculation as to whether *Microsoft Windows* will be the standard or whether *TopView* will supplant it as the product gets enhanced and refined by IBM. Some software developers are already announcing support for one or the other, leaving the end user with little guidance on which way to jump.

GEM is the least spectacular and appeared to have little chance until it was picked up by Atari. Accordingly, stuck to its guns, despite the much touted IBM-Microsoft agreement and says it has no plans to abandon *TopView* and embrace *Microsoft Windows.* The computer press has dubbed *Microsoft Windows* "futuristic" and too slow for PC or XT use. The consensus, which I share, is that *DESQview* is the best available workhorse but lacks the 'momentum' of *Microsoft Windows.*

Looking just at the here and now, it seems appropriate to evaluate how each fits in with PC use in Australia, where standard PCs (rather than ATs) make up the bulk of IBM and compatible computers. It may be that this analysis goes against the US trend. We all know by now that one computer trend is replaced by another at dizzying speed. Today's trend is tomorrow's albatross.

Multi-tasking considerations

PC-DOS does not permit multi-tasking, whereby different



applications can operate and use the CPU simultaneously. RAM resident programs, such as *SideKick* or *Polywindows*, use 'context switching', and insert their address into the BIOS interrupt vector table before terminating. When the 'hot key' interrupt occurs, they move back temporarily. The problem is that DOS code is not re-entrant nor are there inherent memory management techniques. When a program operates, DOS gives it all the memory it has available and cannot prevent the program from fiddling with a block here or there.

Neither is there (currently) multi-tasking with the AT. The 80286 chip works in so-called 'real mode' where it emulates the old 8088 PC processor but also has a 'protected mode' where it can be used as a true Unix-like multi-user, multi-tasking environment, addressing 16M of RAM. Windowing packages do not take advantage of this protected mode, although a few attempts are appearing on the market. Digital Research, by the time you read this, may have announced Concurrent DOS 286, which allows multi-tasking with a DOS emulation feature. For the PC or XT, a user is earthbound by a 640K DOS limit and no real multi-tasking.

TopView allows a pseudo multi-tasking by intercepting DOS calls and emulating their execution without tying up the processor. The result is that some operations are performed slowly, and this sluggishness has become one of the notorious aspects of *TopView*. *Microsoft Windows* uses a different system known as 'non-preemptive scheduling'— each program runs uninterrupted until it makes a call to DOS, at which time, tasks are rescheduled. A developer of the *Microsoft Windows* package, in an interview in PC Tech Journal, stated the truth of the matter: "We think multi-tasking really belongs at the operating system level, and it will get there eventually."

DESQview on the other hand uses 'time-slicing', where the state of a program is stored when it is interrupted and processor time is given in equal slices to each program in turn. *DESQview* swaps interrupted applications back and forth to disk in order to have a number of them available at once. *DESQview*, *Microsoft Windows* and an announced version (ver 1.1) of *Topview*, can use the expanded memory of the new 2M big boards to temporarily store and manipulate swapped programs at great speed. Microsoft, in a bid to keep every one on the edge of their seat, has announced that it is modifying the Lotus-Intel-Microsoft specification to permit *Windows* to use memory beyond 640K so it can handle more applications without the need to swap.

Windowing limitations

Microsoft Windows and *GEM* work with 'bit-mapped' or graphics displays only. Both are limited to shades of black and white unless an Enhanced Graphics Adapter and monitor are used. The problem is that graphics mode slows down the display of characters substantially. Many have said "*Windows* is slow now but . . ." It is, indeed, painfully slow, which is fine for redrawing graphics but not for character-based applications such as word processing. With an Enhanced Graphics Adapter and running on an AT, *GEM* and *Microsoft Windows* are absolutely spectacular. We are, remember, talking about the here and now and for you mundane PC users, a new kind of patience (never before asked of computer users) is being called into play if you use *Microsoft Windows* or *GEM*.

To increase the speed of displays, most sophisticated applications move characters to the screen directly by a block move to the 25 line by 80 character video map. The odd simple program makes a call to DOS in order to send a string to the monitor. These small-time Charlies are referred to as 'well-behaved' and can be placed in a window in any of these programs, with the exception of *GEM*. The other 'ill-behaved' programs cannot be put into a window unless a special driver exists. Alone among the packages, *DESQview* manages to run the ill-behaved *WordStar* and *1-2-3* in separate windows. In all other cases, the ill-behaved require their own screen and memory space as they take over. You may find your favorite application not glimmering in a window but hogging the screen as usual.

Any application must tell the window package what memory it requires and how it goes about its tasks. IBM developed special 369-byte files with a .PIF extension (program information file) to contain the details. *DESQview* and *Microsoft Windows* can make use of these PIF files and in that sense there is a common standard. Although *TopView*, *DESQview* and *Microsoft Windows* come with PIF information for a multitude of programs, there are many that are not included. For anyone but the expert, it may be difficult to answer if your program writes directly to the screen, or what is

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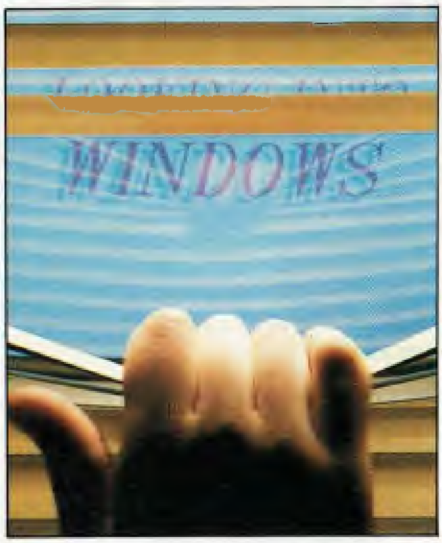


the range of swapped interrupt vectors. It would be good advice to check if your frequently-used programs are supported. I do not expect that many dealers will sit down with you to work out a PIF.

You can expect an occasional system crash. If you have allocated the wrong memory in a PIF or have jiggled with the PATH command, or somehow one program which is going, bumps into one coming, you are going to be caught staring at nothing. If you use standard applications and do not load multiple RAM resident utilities in your AUTOEXEC file, you probably have little cause for concern. Otherwise, back up frequently until the windows package does your bidding satisfactorily.

GEM takes up 120K, *DESQview* 128K, *TopView* 170K and *Microsoft Windows* up to 256K (although it can 'step aside' and only use 40K). Without at least 512K you can forget it. Although you could make it with two floppy drives, a hard disk is certainly more appropriate for all the program swapping. In fact, a hard disk, 640K and an expanded memory board with 2M of RAM seems the sanest way to use any windowing package on a standard PC.

DESQview

DESQview has been relatively ignored. The program, the little brother to *DESQ*, one of the earliest window packages, is the easiest to use and is perfect for the character-based applications of word processing and spreadsheet operation.

DESQview is '*TopView* aware' and takes advantage of PIF files. As well, it has special drivers to make *Enable, Framework, CrossTalk, Volkswriter, Multimate* and the *PFS* family fit and operate within discrete windows — something the other windowing packages will not allow.

When *DESQview* is first installed, it will search your hard disk and automatically take note of programs it recognises. Pressing the Alt key will pop up the *DESQview* menu, the starting place to open windows for applications, which presents a list of recognised programs. New programs are added to the list by answering questions about memory allocation and display. All of the window programs, including *DESQview*, can use a mouse or take instructions from the keyboard.

In addition to listed programs, standard DOS services are available. As well, a 128K naked DOS area can be set aside to run a small program. This is useful for the odd utility that is needed occasionally. The manual recommends that you run memory resident programs, such as *SideKick*, in a separate window as a full program, although *DESQview* supports such programs in a RAM residency state.

DESQview contains a 'macro' feature (keyboard enhancement system) which is totally adequate for most purposes and can replace *ProKey* or similar products. There is even a Hayes-compatible auto-dialler. We have come to accept such 'extras' as commonplace, but the *DESQview* macro facility is, standing alone, a superbly-crafted utility.

The first window that is opened appears on the top half of the screen. Any window can be zoomed to fill the whole screen or shrunk to a smaller size. Only a few keystrokes are necessary to switch between windows of applications. It is also possible to load multiple copies of the same program into different windows, which can be handy for a variety of purposes. I have used it to extract boilerplate from one document from a *WordStar* file and put it into another. It has also proved invaluable in programming to examine a function in one part of a program module while writing code that makes use of the same function. Text can be easily marked in one program and transferred to another. A range of cells can be plucked from *1-2-3* and put into a *WordStar* file with little effort.

DESQview is character-based but will scale bit-mapped graphics for supported programs. This feature is not found in *TopView*, the other character-oriented windowing package. The process is slow so it will only be appropriate for infrequent use.

The overwhelming impression in using *DESQview* is that it is a no-nonsense package which has set out to do the job well. It has especially ministered to window management of the most popular programs, which are otherwise not tameable. For use with a PC, here and now, *DESQview* cannot be beaten.

TopView

TopView is here to stay and is unlikely to be abandoned in favor of *Microsoft Windows*. IBM has a history of proprietary operating systems and has already offered seminars for software developers on a new IBM DOS for the 80286 protected mode. As well, *Microsoft Windows* is entirely graphics-based while *TopView* is totally character-oriented, leading to speculation that IBM may view them as separate directions.

Of all the packages, *TopView* most approximates true multi-tasking, which has moved two developers to announce that they are designing applications divided between main tasks and sub-tasks to work in this environment. IBM is clearly trying to convince software developers that is has the most powerful system. It offers a Programmer's Toolkit containing numerous macros, which is best geared for work in assembler.

Microsoft and Digital Research also offer programmer's kits, but there is no such product for *DESQview*. One developer, however, did tell me he received good assistance from Quarterdeck to make his program operate within *DESQview*. Others are said to be making applications '*TopView*-aware' which is sufficient, at the basic level, for *DESQview* and *Microsoft Windows*.

TopView does not replace DOS but sits next to it and redirects character I/O, leaving the file I/O to DOS. A big criticism is that *TopView* cannot execute many simple DOS operations, such as setting a PATH, removing a subdirectory or even using wildcards in system commands. FORMAT, CHKDSK, BACKUP and RESTORE, to name a few, have to be installed as separate operations. Most surprising is that it cannot run batch files, cannot handle DOS 3.0 and 3.1 calls, nor will it work with programs that require ANSI.SYS such as the Random House Reference Set.

A new version of *TopView* (ver 1.1), which was not available at the time of writing, is said to support batch files and has expanded the number of supported DOS commands from 17 to 28 as well as providing the link with DOS 3.1. I suggest that unless you can see PATH commands, wildcards, redirection of input or output and piping in a new version of *TopView*, you are limiting rather than expanding your horizons. Why IBM has neglected the normal array of DOS functions is beyond my understanding.

The other major problem with *TopView* (also said to be corrected in the new version) is that it swaps suspended applications back and forth to disk in order to let many operate at once, as is the case with *Microsoft Windows* and *DESQview*. Each program is loaded into memory until available space is exhausted. You are confined to how many will fit into 640K (after *TopView* takes up its 188K) which, these days, is not much. To do any useful sort of cutting and pasting, *TopView* requires additional memory.

Within its limitations, *TopView* has some nice features. Windows can be overlapped on top of each other or tiled side by side. There is a concordance between the logical display of the program and the window, so a window on the right of the screen will reveal the text lines that belong on the right side of the application. There is a special 'filter' for programs that do not use a mouse whereby *TopView* will interpret mouse movements and send the applications the right keyboard cursor combinations.

To be recognised by *TopView*, each program must have its own PIF file, which come with many IBM programs. To its credit, IBM provides a book with detailed information in order to create a PIF for many applications. For those not included, you must answer such questions as whether the program accesses the BIOS keyboard buffer and whether it can run in 'foreground' only. Mercifully, I have seen new products, not included on the IBM list, which come with a PIF file.

DESQview **$169**
Sourceware
586 Pacific Highway
Chatswood NSW 2067
(02) 411 5711

GEM Desktop **$105**
Arcom Pacific
PO Box 13
Clayfield Qld 4011
(07) 52 9522

Microsoft Windows **$195**
Microsoft
1/17 Rodborough Rd
Frenchs Forest NSW 2086
(02) 452 5088

TopView **$272**
IBM (Australia) Ltd
GPO Box 4789
Sydney NSW 2001
(02) 20 531

There are no special files, as in *DESQview*, to run ill-behaved programs in a window. Ill-behaved programs with a PIF will run, but they will take up the whole screen. There is no graphics scaling as in *DESQview* and *TopView* cannot run programs that are RAM-resident.

DESQview wins over *TopView* hands down. There is speculation that IBM will eventually stick *TopView* in ROM, forcing it to become the standard. It will take a lot of changes before I use *TopView*. IBM can be expected to improve *TopView* at (as usual) its own sweet pace.

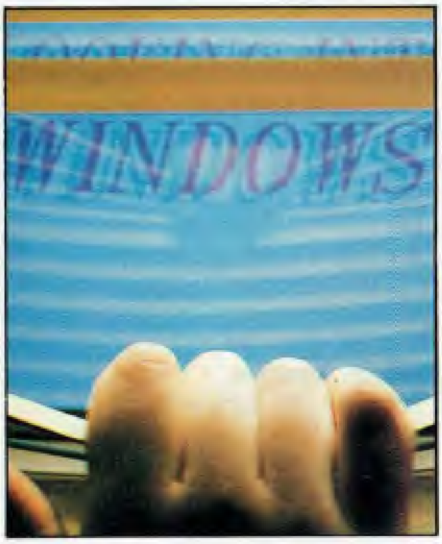
Microsoft Windows

There are few sights more impressive than this program running at top speed, multi-colored on an Enhanced Graphics Display. At the minimum, it requires at least a color graphics card or Hercules graphics adaptor. It is essentially useless on a floppy 8088 system with 256K. Even with a hard disk and a faster 8088-2 replacement, a screen redraw can take a full five or six seconds when cutting and pasting and the disk swapping with more than two programs loaded will be 15 to 18 seconds. An AT, or an expanded memory board used as a large RAM disk, is recommended for tolerable operation.

Microsoft Windows has a DOS executive which replaces COMMAND. COM. It has three parts. The first is the Macintosh-like user interface with icons and tiled windows. I think this is a grand attempt at making a ratty purse from a pigs ear. DOS is not hot but this Mac interface reduces complexity to cuteness. Enough said, better men (or, at least, different men) differ.

The second part of *Microsoft Windows* is known generically as the Graphics Device Interface (GDI) which is a set of graphics primitives and drivers that outside program developers can hook into and use for their own applications. The Software Development Kit is oriented for C and even contains a special version of the Microsoft C Complier.

Similar to the Macintosh, GDI supports full raster operations which use source, pattern and destination bit maps. Two programs, specifically written using this system, have been announced; a graphics presentation system known as In-A-Vision from



Micrografx and Palintir Filer, which I have not seen. Other software houses, such as Living Videotext (*ThinkTank* and *Ready*!) have said they have *Microsoft Windows*-compatible programs in the works.

Microsoft Windows contains a paint program, a word processor, cardfile, notepad, calculator and terminal program. These are not trivial utilities, by any means. 'Write' may not have the features on *Microsoft Word* but it works in a similar way as long as you can tolerate the slightly fuzzy graphics text and slow screen update. It is very 'Mac-like' on the screen, with pull-down menus and font options. 'Paint' rivals the commercial paint programs, such as *PC Paint* and *PC Paintbrush,* although it lacks some of the new sophisticated features, such as the text importing of Dr. Halo. I had no trouble using the terminal program although a few reviewers have noted that occasional characters may be dropped at the faster baud rates.

Microsoft Windows will divide the screen into tiled windows if the programs are well-behaved. The first program loaded takes the whole screen and when a second is invoked, the screen splits. Ill-behaved programs cannot run in a window but still must have a PIF file. There are PIF files for about 50 popular programs on the *Microsoft Windows* disks.

Microsoft Windows sells for a relatively low price — $99 in the US and just under $200 in Australia. If you have an EGA set up on an AT, do not even hesitate — this is the best system for multiple applications now available. If you have a PC with a hard disk, without an enhanced graphics adaptor, it is not possible to recommend it unless your applications are generally graphics-based. (Needless to say, that without a hard disk, it should be avoided). For work or number manipulation, the refresh is too slow and the program swapping is interminable. Right here and now, *Microsoft Windows* is not the winner for most users. It is a stellar piece of work that will become more important as our equipment improves.

The GEM collection

Of all the packages, *GEM Desktop* is the least powerful. It is also the least expensive. It has drop-down Mac (but not too Mac) menus, icons and tiled windows which can be zoomed to fill the screen. In an out-of-court settlement with Apple, Digital Research agreed to make changes in *GEM*, such as getting rid of the trash can and other cosmetic alterations. I am not the first to argue that this was a trivial action, and Apple should have taken the imitation as flattery.

You have a fair degree of control over memory allocation when you install a program to run under *GEM*. *GEM* can be asked to step out of the way for large applications and only take up about 20K. Only special *GEM*-specific programs run in windows using a special graphics interface called Virtual Device Interface (VDI), similar in concept to the *Microsoft Windows'* GDI. There are some good *GEM* applications available, such as *GEM Paint, GEM Draw, GEM Graph, GEM Write* (a special version of *Volkswriter* Deluxe) and *GEM Wordchart*, a presentation system which I have not used. All other applications run in the full screen without a PIF file, with no multi-tasking, swapping of programs to disk or cut and paste between applications.

GEM is really a graphics-based DOS shell which can best use a hard disk and gives color only on an EGA system. It only lets you run one program at a time and, if you like icons, at least you can pause for a moment and look at the pretty picture of *WordStar* on a little sheet of paper icon.

Window on the winner

There is no getting away from the sophistication of *Microsoft Windows.* The whole system takes up about 1.5M on my hard disk and 200K of RAM. It comes with a range of handy painting and writing tools and looks fantastic on an EGA. I have very few well-behaved programs and my needs are character-oriented. On my relatively standard PC, *Microsoft Windows* is a curiosity to be played with from time to time. It cannot be lightly dismissed or relegated to the category of "only interesting". I cannot visualise a PC future without its program playing an important part.

For character-based work, *DESQview* is the best and the one to be recommended. It will take about 500K on a hard disk and will run many ill-behaved programs in windows, a feat none of the others can perform. It runs all your pop-up programs either as RAM-resident or in separate windows.

This is one time when it may be worth waiting a little for the smoke to clear. When Microsoft, IBM and TopView are playing so hard to be the leader of the trend, fireworks can be expected which will only benefit us — the users — in the long run. ■

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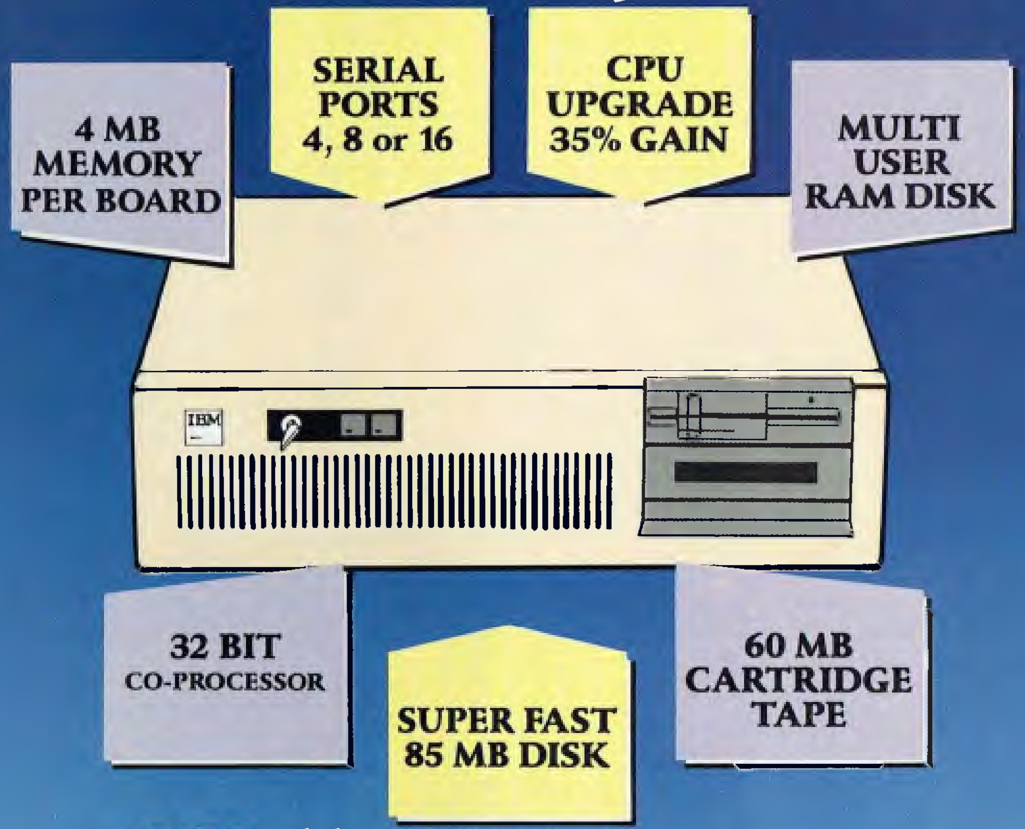

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Get sets–go!

Tom Swan shows how sets can be used in assembly language programs to help the user simplify many applications.

The use of sets in assembly language programming holds some pleasant surprises. When sets are added to an 8086/88 subroutine library, for example, they reduce the size and increase the running speed of the programs. The added value of sets and set operators is illustrated in the following simple example: A programmer needs to input a character from the keyboard and test if the character typed is a digit 0 to 9 or a capital letter A to Z. If any other character is entered, an error routine should be called, otherwise the program should continue. One method often used for this operation in 8086/88 programs is shown in figure 1.

Although the program works correctly, continuing only if a legal character is typed, this approach should be avoided for several reasons. First, the logic may be difficult to follow. Unless the code is studied thoroughly, the purpose of, say, the third jump may not be clear. Second, a knowledge of the underlying character set is assumed. In ASCII, the binary values for the characters 0 to 9 are less than those for A to Z. With another character set, this might not be true, and the program will fail.

Third, tests for additional character ranges increase the length of the program, making the code more difficult to understand and more prone to catching a bug.

All of these problems can be avoided with the use of sets. By declaring a set of the legal characters expected by the program, the example can be rewritten as in figure 2.

Besides improving the clarity of the program, additional characters can be tested without increasing the size of the test or slowing it down. With sets, not a single byte is added.

This article deals with the construction of sets in assembly language, how they are represented in memory, and how to include them in programs. SETS.EXT and SETS.ASM (listings 1 and 2, respectively) are in IBM's MASM format, and after assembling, form a stand-alone module that can be linked to host programs with DOS LINK. The linking process is explained with a test program, SETTEST.ASM (listing 3), also written in MASM format.

Comparing sets

A set can be thought of as a box or sphere that can contain objects of a certain *base type*. For example, a set of colors might exist with a base type equal to the 16 colors available on a PC equipped with IBM's Color Graphics Adapter. Figure 3 shows a set of three of those colors — green, red, and yellow — represented by a circle. Elements in the set are inside the circle; elements not contained in the set are outside. All available colors could be inside the set, or the set could be empty. Several sets could exist, each containing a different combination of colors. The only restriction is that no color can be both inside and outside a set at the same time. The programs in this article manipulate enumerated sets. Such sets are finite in principle and small in practice.

In mathematics, parentheses or braces are used to indicate sets; in programming, brackets are more common. The null set is represented by empty brackets: []. The set of colors in figure 3 can be shown this way: [GREEN, RED, YELLOW]. The set of all colors can be shown with elipses between the first and last possible elements: [BLACK...HI-WHITE]. This is the same as listing every element of the set's base type inside the brackets.

Two sets can be compared in much the same way as two simple numbers. Using the color set from figure 3, the comparisons in figure 4 are all true. Equality (=) and inequality (<>) tests work as might be expected — two sets are mathematically equal only if they have exactly the same members. The tests for inclusion (<= and >=) may not be so obvious. A set is less than or equal to another set if all of its members are contained in the other set: A <= B is true only if the members of A are also members of B — if A is a subset of B. Notice in figure 4 that any set is always greater than or equal to the null set []. Although it contains nothing, the null set is valid and can be used in all comparisons and operations.

Another set comparison is the membership test. In this test, a set is examined for a particular element; the operator is the word IN. The two membership tests in figure 4 determine if RED is or is not in a set of colors. Both statements are true.

Sets not only can be compared mathematically but combined mathematically as well. Again, familiar mathematical symbols are used (see figure 5). Some of the results may surprise users unfamiliar with sets and set operators. The operators are union (+), difference (-), and intersection (*). They work as follows (assume two sets, A and B, are to be combined into a new set C):

- Set union (C = A + B). The set of elements C equals all the elements in set A plus all the elements in set B.
- Set difference (C = A - B). The set of elements C equals the elements in set A, that are not also in set B.
- Set intersection (C = A * B). The set of elements C equals those elements found in both sets A and B.

Figure 5 shows sample expressions using the set of colors from figure 3. Each statement is correct.

```
begin:
      call  input           ;get character into dl register
      cmp   dl,'0'          ;is it less than 0-9, A-Z?
      jb    begin           ;if yes, repeat
      cmp   dl,'9'          ;is it in 0-9 range?
      jbe   continue        ;if yes, jump to continue
      cmp   dl,'A'          ;is it less then A?
      jb    begin           ;if yes, repeat
      cmp   dl,'Z'          ;is it in A-Z range?
      ja    begin           ;if no, repeat, else continue
continue:
```

Figure 1: Sample test code.

```
begin:
     call input                   ;get character into dl
lea  di,legal_chars         ;address set of legal characters
mov  ah,0                   ;prepare for set membership test
     call sets                    ;test if dl is in set
     jne  begin                   ;if no, repeat, else continue
continue:
```

Figure 2: Improved test code.

Sets in memory

Because one element is either in a set or *not* in a set, it can be stored in a single bit, which is equal only to 0 or 1. Elements are either present (1) or absent (0). A set of elements, then, is easily represented in memory as an array of bits, with each bit reserved by the computer for one potential set element.

Figure 6 shows how the set in figure 3 might be represented. In this example, a maximum of 16 bits (and therefore 16 elements) is possible. This is adequate for a limited set, such as the foreground colors on the PC, but will not do for the 128 symbols of the ASCII character set, for example. For larger sets, simply increase the number of bits.

The number of elements in a set has nothing to do with the size of the set in memory. In figure 6, if all of the colors are in the set, then all 16 bits in the set variable would be 1. If the set contains no colors, then all of the bits would be 0. The saturated set [BLACK...Hi-WHITE] and the null set [] take the same amount of memory.

However, the number of *possible* elements does affect the size of a set; this is calculated in bytes with a simple formula for *n* elements:

bytes = ((n − 1) div 8) + 1

Applying this formula, a set of any combination of 256 elements, numbered from 0 to 255, will take 32 bytes of memory. Similarly, 512 elements (0 to 511) will occupy 64 bytes. Remember that *n*, called the *cardinality* of the sets base type, represents the maximum number of possible elements.

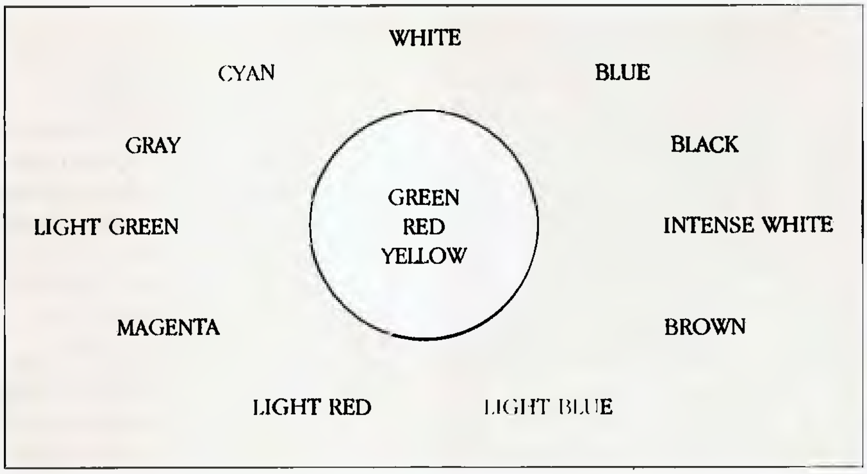

Figure 3: A set of colors.

EQUALITY
[BROWN, LIGHT RED] = [BROWN, LIGHT RED]
[BROWN, LIGHT RED] <> [WHITE, LIGHT RED]
SUBSETS
[BLACK, GREEN] <= [BLACK, BLUE, GREEN]
[BLACK, BLUE, GREEN] >= [ ]
MEMBERSHIP
(RED IN [RED, WHITE, BLUE])
NOT (RED IN [BLUE, GREEN])

Figure 4: Testing sets.

SET UNION (C = A + B)
[RED, WHITE, BLUE] = [RED, WHITE] + [RED, BLUE]
SET DIFFERENCE (C = A − B)
[WHITE] = [RED, WHITE, BLUE] − [RED, BLUE]
SET INTERSECTION (C = A * B)
[RED, BLUE] = [RED, WHITE, BLUE] * [RED, GREEN, BLUE]

Figure 5: Operations on sets.

Sets in programs

Suppose a programmer were writing a custom program for a motel manager who has 190 units to rent. Some of the units are doubles, some are singles, and a few are luxury rooms with kitchens and sitting areas. Occasionally, a unit must be taken out of service for repairs.

The manager wants a quick way to indicate which units are occupied and which are available, and further, which of those are singles, doubles, or luxury apartments. Because the motel is divided into wings, the manager also should be able to show this information for the north, south, east, or west divisions. This example will assume that the motel rooms are numbered from 0 to 189. (A real situation might involve room numbers such as A-15N and C-99S. These numbers first will have to be converted, or mapped, to the numbers 0 to 189 by the program.)

This is a database problem that could have several solutions. Each room, for example, could have a record with fields for indicating if the room is a single or double, whether it is occupied, if it is being repaired, and so forth. This is certainly a reasonable approach, but displaying the status of all rooms in a certain category require a sequential search of the database. With sets the data are available instantly, and the programming is greatly simplified.

Set variables are needed for each category. Figure 7 shows how this might be programmed in assembly language. A set data type is defined as a 32-byte variable using the assembler's STRUCT operator. Then

variables for NORTH, SOUTH, EAST, WEST, SINGLES, DOUBLES, LUXURY, and OCCUPIED are defined and included as part of the program's data segment.

If the manager enters a command to display all unoccupied singles in the south wing, the Pascal fragment in figure 8 shows how the request can be satisfied. (It is sometimes helpful to express ideas in a structured language, such as Pascal, before writing an assembly language program — a welcome change to flow charts.)

Yet, an even easier and faster way to satisfy this request calls on the set intersection and difference operations. A new set can be formed that satisfies the search argument "in the south wing, single, and unoccupied". The expression is written in this way:

```
TEMP = (SOUTH * SINGLES) -
  OCCUPIED
```

That is, TEMP is the set of room numbers whose members are in both sets SOUTH and SINGLES, but are not in the set of OCCUPIED rooms. This expression, coded in an assembly language fragment, is listed in figure 9. Considering the conventional database programming required to produce the same results — opening a file, reading each record, and testing various fields stored in the record — the use of sets reduces the amount of writing necessary.

Limitations

Some other searches may not be as easily accomplished with sets. For example, the motel manager undoubtedly would want to keep a list of the reservations for certain types of units, listing starting and ending dates, along with the names of the persons who made the reservations. While sets are useful for recording a variety of limited attributes, they are not as good for recording names and addresses, telephone numbers, and dates. The point is, that while all data can be represented as belonging to a set of certain class, some are more practically dealt with using sets than others.

For example, if a set could contain 32,768 elements, it would take 4K of memory (4096 bytes by the formula presented earlier) even if the set contained only one element. Such a representation might be economical in some applications (a specialised database, for example) but practically speaking, sets of those dimensions are seldom useful. Keeping in mind the goals of reducing memory and increasing speed, a more reasonable limit for sets must be found. (Arbitrary limits can be set on the maximum number of bytes. Sets that are limited to 32 bytes would have a maximum of 256 elements — a practical amount. It is also common to see maximums of 512 and 128 elements, 64 and 16 bytes, respectively).

Decreasing the 32-byte set size is easy. For example, if no values greater than 127 are inserted, a 16-byte set variable can be used; values no greater than 31 will fit into 4 bytes and so on.

Increasing set size, however, is more difficult. Because SETS.ASM uses byte arithmetic and 8-bit registers to hold set values, going beyond 32 bytes requires major surgery. Still, this is not as restrictive as it may seem. If more than 255 elements are to be stored in a set, a simple solution is to use two set variables, A and B for example. Set A could represent values from 0 to 255, set B values 256 to 511. This approach could be extended to represent an arbitrarily large set of values.

Finally, a more fundamental limitation is imposed on the sets described here: they must be finite. Each element, while represented in the set by a single bit, must have a corresponding integer value for use as an index into the set. For example, the color MAGENTA might be given the value 4 in an equate statement, with other colors given other values (refer to figure 6). Another suitable base type is the ASCII character set, numbered from 0 to 127 (extended to 255). However, the set of all positive integers, numbered from 0 to infinity, would be unsuitable. Clearly this is out of the finite memory range of the computer (even those with extra RAM cards installed). A subset of integers from 0 to 31, for example, can be programmed. The user will find it helpful to keep such limitations in mind when designing programs that use sets.

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	0	1	0	0	0	0	0	0	0	0	0	1	0	1	0
BLACK	HI.WHITE	YELLOW	LT.MAGENTA	LT.RED	LT.CYAN	LT.GREEN	LT.BLUE	GRAY	WHITE	BROWN	MAGENTA	RED	CYAN	GREEN	BLUE

Figure 6: Sets in memory.

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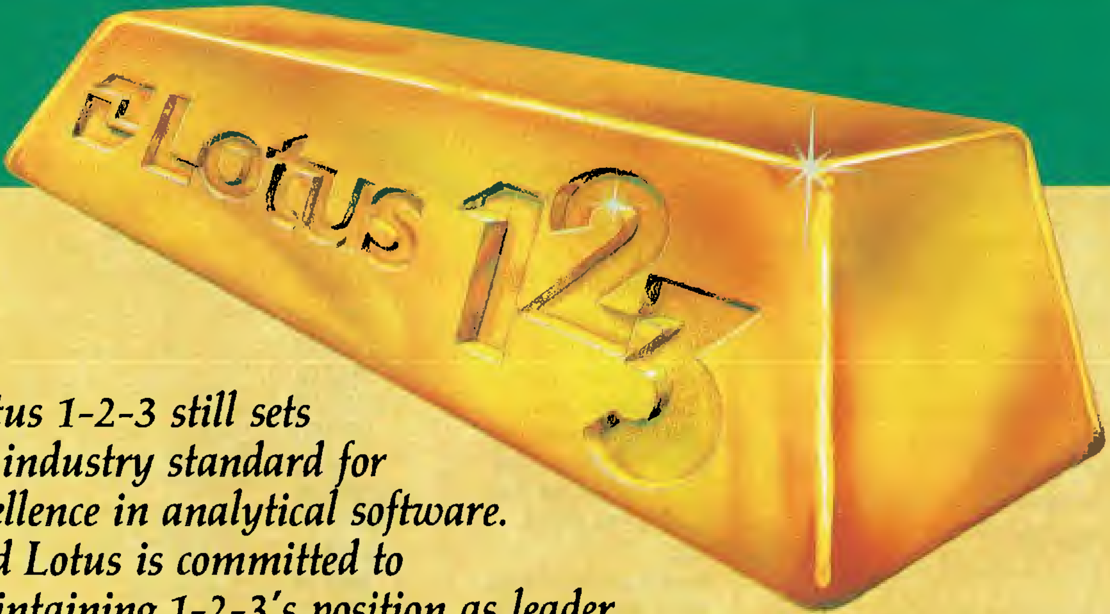

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SETS

Assembling SETS.ASM

The SETS module in listings 1 and 2 contains procedures for adding sets to assembly language programs. First type in SETS.EXT and SETS.ASM with a text editor. The command MASM SETS; will assemble both into the SETS.OBJ module. This module is a set of subroutines that cannot be run directly — do not link it yet. In order to use the procedures in the module, a host program must be written and assembled; the resulting code is then linked to SETS.OBJ.

Although this may seem like a lot of trouble, the advantage of this approach is that SETS.ASM never has to be assembled again. Any number of host programs can be written and linked to the SETS.OBJ file. Furthermore, because the programming in the module does not have to be reassembled, host programs will assemble faster than if the sets procedures are included directly in the assembly language text. If a change is made to the sets module, however, the programs will have to be reassembled and a new SETS.OBJ file created.

SETTEST.ASM is a sample host program that demonstrates how to use the sets module procedures. Check to see that SETS.EXT and SETS.OBJ are in the same directory and assemble SETTEST. Before running the test, link the resulting SETTEST.OBJ file with the sets module as follows with the command LINK SETTEST+SETS;. (This program *cannot* be converted to a .COM file).

To run the test, enter SETTEST. The program will provide three strings of characters, one string at a time. Type all the letters and digits displayed for each string. If any extra characters (that are not shown) are typed accidentally, that test will have to be repeated. In addition, the upper- and lowercasing of letters is significant, but characters may be entered in any order. The characters typed must correspond exactly with the characters that appeared on the screen before the program will

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continue. After three tests have been performed, the example program ends.

This somewhat contrived example uses nearly all of the programming in the sets module. The first part of the program, and the main body beginning at SETTEST, are standard for 8086/88 programs, and should be easy to follow. The PRINT procedure displays a string addressed by register SI. PRINT contains an internal subroutine, NEWLINE, that is called separately to display blank lines.

Procedures TEST and REPORT both make good use of sets. In TEST, the two set variables CHSET and DONESET are declared using the set<> structured data type (declared in the SETS.EXT include file). The only input to TEST is register SI, which must address the string of characters to be used in this typing test. Only when all characters in that string are entered — in any order — will the test end. The string must begin with a byte that indicates its length.

After displaying the string addressed by SI, TEST uses set function 4 to create DONESET, which contains a set of all the characters in the string. Next, CHSET is nulled with a call to set function 10. The main loop of the TEST procedure begins at the label TEST1:. DOS function 1 is called to get and echo a character from the keyboard. With set function 8, this character is inserted into GHSET. As the loop repeats, the set of all characters entered by the user is collected in CHSET.

The test ends when all characters entered are found in DONESET (when DONESET is found to be a subset of CHSET), ignoring any extra characters typed. Notice how registers SI and DI are reversed before set function 6, the inclusion test, is called (just after the label TEST1:). If CHSET were tested as a subset of DONESET, the test would either end immediately (after a single correct character) or continue forever (if the first character were incorrect). A check can be performed by removing the two **xchg si,di** instructions.

The REPORT procedure also uses sets to display the accuracy of keyboard typing. It assumes that DONESET equals the set of expected characters for the test, and CHSET contains those characters plus any extra characters typed. The extra characters are easily extracted from CHSET by finding the difference of CHSET – DONESET using set function 2. Printing these characters is accomplished with a simple loop beginning at label REP1: with the set membership test. An ERROR flag indicates the presence of extra characters in CHSET. If none is present, *Done* is displayed. REPORT passes the zero flag ZF back to the TEST procedure, which repeats the last test until only the expected characters are entered.

This test could be used as a shell for user-written programs — just remove procedures PRINT, TEST, and REPORT. Two macros simplify calls to DOS and to the sets module. To call a DOS function, use DOSFN *n* where *n* is any DOS function number. To call a set function, use SETFN *n*, where *n* is a set function number, 0 to 9.

Sets module procedures

Each procedure of the SETS module is listed below with its necessary parameters (refer to listing 1) and other information. To call a procedure, place a selection code in register AH, set the appropriate parameters, and call SETS. A macro can be used, as shown in SETTEST.ASM. After calling SETS, the results of the operation can be tested. All registers are preserved by the sets module. (The := symbol indicates assignment to the variable on the left from the expression on the right).

```
SETLEN    EQU  32
SET       STRUC
          DB   SETLEN DUP(0)
SET       ENDS

DSEG      SEGMENT PARA PUBLIC 'DATA'

NORTH     SET<>
SOUTH     SET<>
EAST      SET<>
WEST      SET<>
SINGLES   SET<>
DOUBLES   SET<>
LUXURY    SET<>
OCCUPIED  SET<>

DSEG      ENDS
```

Figure 7: Creating set variables

```
for UNIT := 0 to 189 do
   begin
        if ( UNIT in SOUTH ) and
           ( UNIT in SINGLES ) and
           ( not ( UNIT in OCCUPIED )) then DISPLAY_UNIT_NUMBER
end;
```

Figure 8: Sample Pascal code

```
LEA  SI,SOUTH              ;ADDRESS SOUTH SET WITH SI
LEA  DI,SINGLES            ;ADDRESS SINGLES SET WITH DI
MOV  AH,3                  ;SELECT SET INTERSECTION
CALL SETS                  ;SINGLES <- (SOUTH*SINGLES)
LEA  SI,SINGLES            ;ADDRESS SINGLES SET WITH SI
LEA  DI,DCCUPIED           ;ADDRESS OCCUPIED SET WITH DI
MOV  AH,2                  ;SELECT SET DIFFERENCE
CALL SETS                  ;OCCUPIED <- (SINGLES-DCCUPIED)
```

Figure 9: A set expression in code

(AH)=0 Set membership. (V IN SET) Set ES:DI to the address of a set variable, and place an 8-bit test value in DL. On return, if ZF=1 (use jz), then the value in DL was not found in the set. If ZF=0 (use jnz), then the value was found.

Membership is easily determined by isolating the position of the bit in the set for the value being tested. This is done with a call to local procedure SETCALC, which returns AL with the byte containing that bit, AH with the bit in its relative position in that byte, and BX as an offset into the set where that byte is located. After that, membership is determined by TESTing the bit in AL with the byte in AH, setting flag ZF if the bit is equal to 1.

(AH)=1 Set union. (SET2 := SET1 + SET2) Set DS:SI to the address of SET1 and ES:DI to the address of SET2. Call SETS to form the union of the two, with the results replacing SET2. Set union is the logical OR of all bytes in the sets from which the union is formed. By ORing all bytes, all bits equal to 1 in both sets are transferred to SET2.

(AH)=2 Set difference. (SET2 := SET1 – SET2) Set DS:SI to the address of SET1, and ES:DI to the address of SET2. Call SETS to form the difference of the two sets, with the results replacing SET2.

Set difference is the logical AND of the complement of all bytes in the set being subtracted from SET1. The programming of set difference can be described this way: for each byte in SET2, complement one byte, AND the result with the same byte in SET1, and store the result back in SET2. Complements are formed by the exclusive ORing of bytes with FFH.

(AH)=3 Set intersection. (SET2 := SET1 * SET2) Set DS:SI to the address of SET1, and ES:DI to the address of SET2. Call SETS to form the intersection of the two, with the results replacing SET2.

Set intersection is simply the logical AND of all bytes in both sets from which the intersection is formed. By ANDing all bytes, only bits equal to 1 in both sets are transferred to the result.

(AH)=4 Make set from string. (SET := [S(1),S(2),...,S(n)]) Set DS:SI to the address of the first byte of a string of any 8-bit values. The first byte of the string must be the length of the string, followed by that many characters (or other values). Set ES:DI to the address of a destination set. This function creates a new set equal to the set of all characters in the string. Any values previously in SET are lost. Values are inserted into the set by ORing the appropriate bits into the destination set.

(AH)=5 Make set alternate. (SET := SET + [S(1),S(2),..:,S(n)]) Use the same parameters as in function 4. Each value in the string is inserted into SET, but values already in SET are not removed. This is equivalent to the union of a set with the set of characters in the string.

(AH)=6 Set inclusion. (SET1 <= SET2) Set ES:DI to the address of SET1, and DS:SI to the address of SET2; this is the reverse sense of many operations. Use this function to determine if SET1 is a subset of SET2. Be careful to assign SI and DI in the correct order.

Set inclusion is found by forming the logical AND of all bytes in both SET1 and SET2, then checking if the result is unchanged from the original values in SET1. The logical AND of the bits in SET1(n) with SET2(n) will equal the bits in SET1(n) only if all bits also are found in SET2(n). That is, for SET1 to be a subset of SET2, all elements of SET1 also must be present in SET2.

(AH)=7 Set comparison. (SET1 = SET2) Set DS:SI to the address of SET1, and ES:DI to the address of SET2. Call SETS to compare the two set variables. No changes are made to SET1 or SET2. The sets module returns the ZF flag which can be tested as follows:

(ZF = 1) (SET1 = SET2) (use JE)
(ZF = 0) (SET1 <> SET2) (use JNE)

Set comparison is easily accomplished by comparing all bytes in both sets. Because SI and DI are used to address the set variables, this can be done quickly in 8086/88 assembly language using the CMPSB (compare string byte) instruction with a repeat prefix, REPZ. A word comparison (CMPSW) was not used on the chance that a future version of SETS would not have an even number of bytes in set variables. The

LISTING 1: SETS.EXT

```
;SETS.EXT
;External declarations


;----------------------------------------
;       Equates
;----------------------------------------
setlen  equ     32                      ;bytes in one set


;----------------------------------------
;       Type declarations
;----------------------------------------
set     struc                           ;all new sets are empty
        db      setlen dup(0)
set     ends


;----------------------------------------
;       External declarations
;----------------------------------------
if host
        extrn   sets:near
endif
```

LISTING 2: SETS.ASM

```
page 60,132
title   Sets 1.01
;------------------------------------------------------------
;  Program      : Sets (Set handling package)
;  Version      : 1.01
;  System       : IBM PC DOS 2.00+
;  Language     : IBM 8088/86 Macro Assembler
;  Author       : (C) 1984 by Tom Swan
;  Address      : Swan Software  P.O. Box 206  Lititz PA  17543
;------------------------------------------------------------
true    equ     -1
false   equ     0
host    equ     false                   ;true for host program only
maxfn   equ     10                      ;maximum function number
```

comparison would be twice as fast, however, if CMPSW were used. In that case, CX would have to be set to half the byte length of a set variable.

(AH)=8 Add element. (SET := SET + [ELEMENT]) Set ES:DI to the address of a SET variable. Place any 8-bit value in DL and call SETS to add that value to the SET. No existing members of the set are disturbed. If the element is already in the SET, then this function has no effect. This operation is equivalent to the union of one set with a set that contains only one element.

Adding an element to a set is similar to testing for membership (function 0), except that the logical OR of the appropriate bit is stored directly in the result instead of setting the ZF flag.

(AH)=9 Copy set. (SET1 := SET2) Set DS:SI to the address of the source set (SET2), and ES:DI to the address of the destination set (SET1). Call SETS to copy the source to the destination set.

A very fast copy is possible using the 8086/88 MOVSB instruction to move the byte addressed by DI directly to the byte addressed by SI, without going through an intermediate register. Also, a repeat prefix REP makes it possible to copy the entire set with a single, although repeated, instruction.

(AH)=10 Make null set. (Set := []) Set ES:DI to the address of a set variable. Call SETS in order to make that set equal to the null set.

Nulling a set is accomplished by setting all bytes in the set equal to 0. This is done as quickly as possible with the use of a repeat prefix in front of the STOSB instruction.

These procedures enable programmers to add sets to assembly language programs and to make use of features normally found only in higher-level languages. Judicious use of set comparisons, set operators, and set membership tests can reduce program size while increasing speed. ■

Tom Swan runs Swan Software, a consulting business.

```
;-----------------------------------------------------------------
;
;  * All sets are composed of 32 bytes.  each bit represents
;    one of 256 values in the set.  If the bit = 1, that value
;    is in the set, else that value is absent.
;
;  * Except for flags, all registers are preserved.
;
;  * Set routines are called by placing a selection value in ah and
;    calling "sets".  See individual routines for exact parameters.
;
;      example:  mov  dl,value         ;value to test
;                lea  di,anyset        ;address first byte in set
;                mov  ah,0             ;select set membership test
;                call sets             ;call set routine
;                jnz  success          ;found value in set
;
;  * Procedures in the module include:
;
;               (ah) = 0  set membership
;               (ah) = 1  set union
;               (ah) = 2  set difference
;               (ah) = 3  set intersection
;               (ah) = 4  make set from string
;               (ah) = 5  make set alternate entry
;               (ah) = 6  set inclusion
;               (ah) = 7  set comparison
;               (ah) = 8  add single element to set
;               (ah) = 9  copy set to set
;               (ah) = 10  make null set
;
;-----------------------------------------------------------------
page
dgroup  group   dseg
cgroup  group   cseg
        assume  cs:cgroup, ds:dgroup, es:dgroup, ss:nothing
;-----------------------------------------
;       Code Segment
;-----------------------------------------
```

```
cseg    segment byte public 'code'
        include sets.ext                ;include global equates
        public  sets
sets    proc    near
        cld                             ;clear df (set auto-increment mode)
        push    ax                      ;save all registers
        push    bx
        push    cx
        push    dx
        push    di
        push    si

; Use function number in ah as an offset into a jumptable containing
; the addresses of the various set functions.  Jump to selected function.

        cmp     ah,maxfn                ;test for illegal selector
        ja      setexit                 ;exit if ah > 6
        mov     bx,offset jumptable     ;bx=base addr (in cseg)
        mov     al,ah                   ;place function number in al
        xor     ah,ah                   ;zero ah to make word in ax
        shl     ax,1                    ;ax<-ax*2 (16-bit word offset)
        add     bx,ax                   ;bx<-bx+ax forming table address
        jmp     word ptr cs:[bx]        ;jump to routine at cs:[bx]
; All routines jump to here when done.  Restore all destroyed
; registers and return to caller.
setexit:
        pop     si                      ;restore all registers
        pop     di
        pop     dx
        pop     cx
        pop     bx
        pop     ax
        ret                             ;return to caller
sets    endp
page
;---------------------------------------------------------------
; SETCALC
;---------------------------------------------------------------
; Purpose       -- calculate word address and bit position
;                  for a set value.
```

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```
;
; Called by      -- functions 0,4,5,8
;
; Arguments      -- (es:di) = address of set (first word)
;                      (dl) = value (8-bits) to test
;
; Returns        -- (al) = byte from set for value in dl
;                   (ah) = bit in relative position for value
;                   (bx) = offset of word (i.e. at ds:[di+bx])
;------------------------------------------------------------
dseg    segment byte public 'data'
bittab  db      01h,02h,04h,08h,10h,20h,40h,80h ;bits 0..7 set = 1
dseg    ends
setcalc proc    near
; byte offset = value div 8
; bit offset = value mod 8
        push    di                          ;save di register
        xor     ax,ax                       ;zero ax so that ah=0
        mov     al,dl                       ;set ax=value dl (16-bits)
        mov     bh,8                        ;set bh=divisor
        div     bh                          ;al <- ax div bh ;ah <- ax mod bh
        xor     bx,bx                       ;zero bx so that bh=0
        mov     bl,ah                       ;bx <- value mod 8 (bittab offset)
        lea     di,bittab                   ;address 8-byte bit table
        mov     ah,byte ptr [di+bx]         ;ah <- bit in relative position
        pop     di                          ;restore register (address of set)
        mov     bl,al                       ;bx <- value div 8 (set offset)
        mov     al,byte ptr [di+bx]         ;al <- byte from set for value dl
        ret                                 ;return to caller
setcalc endp                                ;end procedure
page
;------------------------------------------------------------
; SET0  (ah=0)  set membership          (v in set)
;------------------------------------------------------------
; Purpose        -- test for presence of value (v) in set
;
; Called by      -- set jump table
;
; Calls          -- setcalc
;
; Arguments      -- (es:di) = address of set
;                      (dl) = 8-bit value (v)
;
; Registers      -- zf=1 = value not present     (use jz)
;                   zf=0 = value present         (use jnz)
;------------------------------------------------------------
set0    proc    near
        call    setcalc                     ;ax=value; bx=address; cx=bit
        test    al,ah                       ;test bit in ah against set val
        jmp     setexit                     ;end function 0
set0    endp
page
;------------------------------------------------------------
; SET1  (ah=1)  set union       (set2 <- set1 + set2)
;------------------------------------------------------------
; Purpose        -- make set2 equal to all elements in set1
;                   plus elements already in set2.
;
; Called by      -- main jump table
;
; Calls          -- none
;
; Arguments      -- (ds:si) = address of set1
;                   (es:di) = address of set2
;
; Registers      -- none

;------------------------------------------------------------
set1    proc    near
        mov     cx,setlen                   ;cx=number bytes in set
set1_1:
        lodsb                               ;al<-[si]; si<-si+1
        or      byte ptr [di],al            ;[di]<-logical or of [di],al
        inc     di                          ;advance destination set pointer
        loop    set1_1                      ;loop on cx
        jmp     setexit                     ;end set1
set1    endp
page
;------------------------------------------------------------
; SET2  (ah=2)  set difference          (set2 <- set1 - set2)
;------------------------------------------------------------
; Purpose        -- make set2 equal to the set of elements of set1
;                   which are not also members of the original set2
;
; Called by      -- main jump table
;
; Calls          -- none
;
; Arguments      -- (ds:si) = address of set1
;                   (es:di) = address of set2
;
; Registers      -- none
;------------------------------------------------------------
set2    proc    near
        mov     cx,setlen                   ;cx=number bytes in set
set2_1:
        xor     byte ptr [di],0ffh          ;complement byte at [di]
        lodsb                               ;al<-[si]; si<-si+1
        and     byte ptr [di],al            ;[di]<- logical and of [di],al
        inc     di                          ;advance destination set pointer
        loop    set2_1                      ;loop on cx
        jmp     setexit                     ;end function 2
set2    endp
page
;------------------------------------------------------------
; SET3  (ah=3)  set intersection        (set2 <- set1 * set2)
;------------------------------------------------------------
; Purpose        -- make set2 equal to the set of elements in
;                   both set1 and the original set2
;
; Called by      -- main jump table
;
; Calls          -- none
;
; Arguments      -- (ds:si) = address of set1
;                   (es:di) = address of set2
;
; Registers      -- none
;------------------------------------------------------------
set3    proc    near
        mov     cx,setlen                   ;cx=number bytes in set
set3_1:
        lodsb                               ;al<-[si]; si:=si+1
        and     byte ptr [di],al            ;[di]<- logical and of [di],al
        inc     di                          ;advance destination set pointer
        loop    set3_1                      ;loop on cx
        jmp     setexit                     ;end set3
set3    endp
page
;------------------------------------------------------------
; SET4  (ah=4)  make set from string    set <- [s(1),s(2),...,s(n)]
;------------------------------------------------------------
; Purpose        -- insert 8-bit elements from string (s)
;                   into the set.  Assumes first byte of string
;                   indicates length.
;
; Called by      -- main jump table
;
; Calls          -- set5         (via fall-through)
;
; Arguments      -- (ds:si) = address first byte of string (s[0])
;                 . (es:di) = address of destination set
;
; Registers      -- none
;------------------------------------------------------------
set4    proc    near
        mov     cx,setlen                   ;set cx=number bytes in set
        xor     al,al                       ;set al=0 (value to store in set)
        push    di                          ;save di (set address) on stack

;----- make existing set null

rep     stosb                               ;store al at [di] until cx=0
        pop     di                          ;restore di
                                            ;fall through to set5 procedure
set4    endp
page
;------------------------------------------------------------
; SET5  (ah=5)  make set alternate      set <- set + [s(1),s(2),...,s(n)]
;------------------------------------------------------------
```

```
; Purpose       -- add 8-bit elements from string s into
;                  an existing set
;
; Called by     -- main jump table
;                  set4                    (via fall-through)
;
; Calls         -- setcalc
;
; Arguments     -- (ds:si) = address first byte of string (s[0])
;                  (es:di) = address of destination set
;
; Registers     -- none
;------------------------------------------------------------
set5    proc    near
        xor     cx,cx                   ;zero cx so that ch=0
        lodsb                           ;get length al<-[si]; si<-si+1
        mov     cl,al                   ;set cx=count of chars in string
        jcxz    set5_2                  ;exit on null string
set5_1:
        lodsb                           ;get byte al<-[si]; si<-si+1
        mov     dl,al                   ;move value in al to dl for setcalc
        call    setcalc                 ;calculate byte offset bx; bit ah
        or      byte ptr [di+bx],ah     ;or bit in ah into set byte
        loop    set5_1                  ;cx<-cx-1; if cx<>0 then loop
set5_2:
        jmp     setexit                 ;end set5
sat5    endp
page
;------------------------------------------------------------
; SET6  (ah=6)  set inclusion           set1 <= set2
;------------------------------------------------------------
; Purpose       -- test if set1 is a subset of set2
;
; Called by     -- main jump table
;
; Calls         -- none
;
; Arguments     -- (es:di) = address of set1
;                  (ds:si] = address of set2
;
```

```
; Registers     -- zf = 1 if set1 <= set2       (use je)
;                  zf = 0 if not (set1 <= set2) (use jne)
;------------------------------------------------------------
set6    proc    near
        mov     cx,setlen               ;cx=number bytes in set
set6_1:
        lodsb                           ;al <- [si]; si := si + 1
        and     al,byte ptr [di]        ;al <- [si] & [di]
        cmp     al,byte ptr [di]        ;compare with original byte
        jne     set6_2                  ;jump on difference found
        stosb                           ;advances di (value [di] unchanged)
        loop    set6_1                  ;loop on cx (flags preserved)
set6_2:
        jmp     setexit                 ;end set6
set6    endp
page
;------------------------------------------------------------
; SET7  (ah=7)  set comparison          set1 = set2
;------------------------------------------------------------
; Purpose       -- test if set1 equals set2
;
; Called by     -- main jump table
;
; Calls         -- none
;
; Arguments     -- (ds:si) = address of set1
;                  (as:di) = address of set2
;
; Registers     -- zf = 1 if set1 = set2        (use je)
;                  zf = 0 if set1 <> set2       (use jne)
;------------------------------------------------------------
set7    proc    near
        mov     cx,setlen               ;cx=number bytes in set
repz    cmpsb                           ;compare [si],[di]
                                        ;loop on cx if equal
        jmp     setexit                 ;end set7
set7    endp
page
;------------------------------------------------------------
;  SET8 (ah=8)  add element     set1 := set1 + [element]
```

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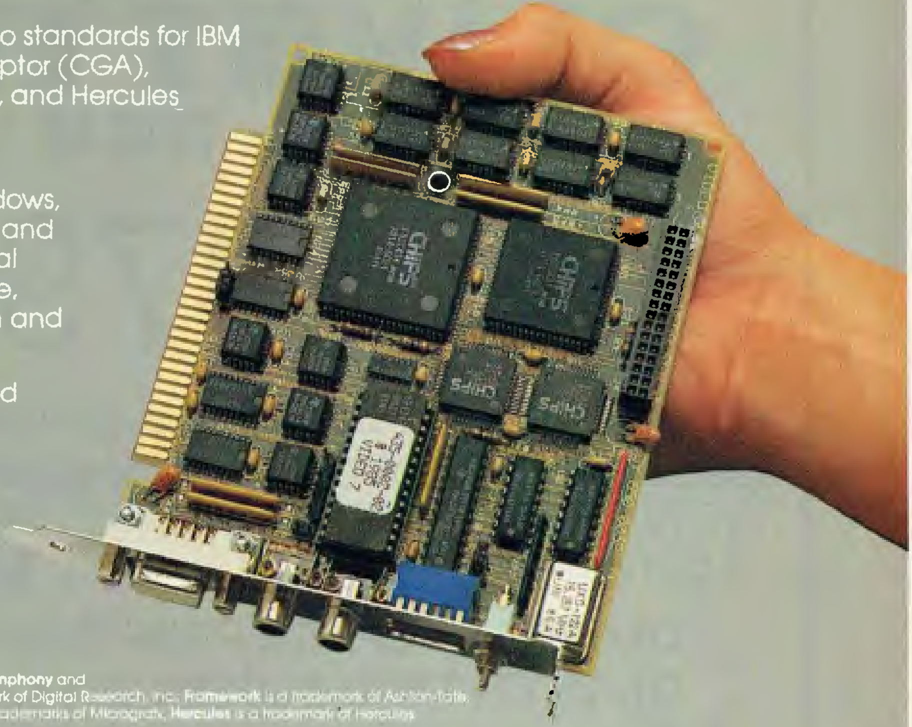

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```
;------------------------------------------------------------
; Purpose        -- add one element to members of a set
;
; Called by      -- main jump table
;
; Calls          -- setcelc
;
; Arguments      -- (es:di) = address of destination set
;                       (dl) = 8-bit element to add
; Registers      -- none
;------------------------------------------------------------
set8    proc    near
        call    setcalc                 ;calculate byte offset bx; bit ah
        or      byte ptr [di+bx],ah     ;or bit in ah into set byte
        jmp     setexit                 ;end set8
set8    endp
page
;------------------------------------------------------------
; SET9  (ah=9)  copy set        set1 := set2
;------------------------------------------------------------
; Purpose        -- copy one set variable to another
;
; Called by      -- main jump table
;
; Calls          -- none
;
; Arguments      -- (ds:si) = address of set2 (source)
;                   (es:di) = address of set1 (destination)
;
; Registers      -- none
;------------------------------------------------------------
set9    proc    near
        mov     cx,setlen               ;cx=number bytes in set
rep     movsb                           ;copy [di]<-[si] until cx=0
        jmp     setexit                 ;end set9
set9    endp
page
;------------------------------------------------------------
;  SET10        (ah=10) make null set           set1 := []

;------------------------------------------------------------
; Purpose        -- make a set variable equal to the null set
;
; Called by      -- main jump table
;
; Calls          -- none
;
; Arguments      -- (es:di) = address of set1
;
; Registers      -- none
;------------------------------------------------------------
set10   proc    near
        mov     cx,setlen               ;cx=number bytes in set
        xor     al,al                   ;al <- 0
rep     stosb                           ;store al at [di] until cx=0
        jmp     setexit                 ;end set10
set10   endp
page
;---------------------------------------
;       Jump Table (in code segment)
;---------------------------------------
; following are the addresses of the individual routines in the set
; package.  the list of addresses forms a table for selecting a
; function based on the value in ah.
jumptable:
        dw      set0                    ;fn0-set membership
        dw      set1                    ;fn1-set union
        dw      set2                    ;fn2-set difference
        dw      set3                    ;fn3-set intersection
        dw      set4                    ;fn4-make set
        dw      set5                    ;fn5-add to set
        dw      set6                    ;fn6-set inclusion
        dw      set7                    ;fn7-set comparison
        dw      set8                    ;fn8-add single element
        dw      set9                    ;fn9-copy set to set
        dw      set10                   ;fn10-make null set
cseg    ends                            ;end of code segment
        end                             ;end of text
```

LISTING 3: SETTEST.ASM

```
page 60,132
title   SETTEST.ASM  1.00
;------------------------------------------------------------
;  Program      : Sets module test program
;  Version      : 1.00
;  System       : IBM PC-DOS 2.00+
;  Language     : IBM 8088 Macro Assembler
;  Author       : (C) 1985 by Tom Swan
;  Address      : Swan Software  P.O. Box 206  Lititz PA  17543
;------------------------------------------------------------
true    equ     -1
false   equ     0
host    equ     true

;---------------------------------------
;       Code, data, stack groups
;---------------------------------------
dgroup  group   dseg
cgroup  group   cseg
sgroup  group   sseg
        assume  cs;cgroup, ds:dgroup, es:dgroup, ss:sgroup

;---------------------------------------
;       Equates
;---------------------------------------
cr      equ     13                      ;ASCII carriage return
lf      equ     10                      ;ASCII line feed

;---------------------------------------
;       Macro definitions
;---------------------------------------

; Call dos function p1

dosfn   macro   p1                      ;;"dosfn 2" calls dos function #2
        mov     ah,p1                   ;;pass function number in ah
        int     21h                     ;;call dos via interrupt 21 hex
        endm
; Call sets function

setfn   macro   n                       ;;"setfn 8" calls sets function #8
        mov     ah,n                    ;;elect function n
        call    sets                    ;;call sets package (near)
        endm

;---------------------------------------
;       Data segment
;---------------------------------------
dseg    segment byte public 'data'
progid  db      'Set Test Program 1.00',cr,lf
        db      '(C) 1985 by Tom Swan',cr,lf
crlf    db      cr,lf,'$'
donemsg db      cr,lf,'Test completed',cr,lf,'$'

;----- Test strings.  First byte = length.

s1      db      36,'1234567890abcdefghijklmnopqrstuvwxyz'
s2      db      13,'ACEGIKMOQSUWY'
s3      db      13,'BDFHJLNPRTVX2'

dseg    ends

;---------------------------------------
;       Stack segment
;---------------------------------------
sseg    segment para stack 'stack'
        db      8 dup('**Stack*')
sseg    ends

;---------------------------------------
;       Code segment
;---------------------------------------
cseg    segment byte public 'code'

        include sets.ext                ;include global declarations

settest proc    far
        push    ds                      ;set up far return address on stack
        xor     ax,ax                   ; equal to ds:0000.
        push    ax
        push    ds                              ;save value of segment
                                                ; registers ds,es
        push    es
        mov     ax,dseg                         ;prepare to load ds,es via ax
        mov     ds,ax                           ;set ds=data segment address
        mov     es,ax                           ;set es=data segment address
        lea     dx,progid                       ;dx=address program id message
        dosfn   9                               ;print string
        lea     si,s1                           ;test string 1
        call    test
        lea     si,s2                           ;test string 2
        call    test
        lea     si,s3                           ;test string 3
        call    test
        lea     dx,donemsg                      ;dx=address done message
        dosfn   9                               ;print string
        pop     es                              ;restore segment registers es,ds
        pop     ds
        ret                                     ;execute far return to dos
settest endp
page
;---------------------------------------------------------------
; PRINT / NEWLINE
;---------------------------------------------------------------
; Purpose       -- display test string
;
; Called by     -- test
;
; Calls         -- none
;
; Arguments     -- (ds:si) = address of string at len byte
;
; Registers     -- ax,cx,dx destroyed, si preserved
;---------------------------------------------------------------
print   proc    near
        push    si
        cld                             ;clear df for auto increments
        lodsb                           ;al <- [ds:si]; si <- si + 1


        xor     cx,cx                   ;zero cx
        mov     cl,al                   ;cx = string length 0 .. 255
        jcxz    print2                  ;exit if length = 0
print1:
        lodsb                           ;al <- next character from string
        mov     dl,al                   ;transfer al to dl
        dosfn   2                       ;print char in dl
        loop    print1                  ;loop on cx
print2:
        pop     si                      ;restore si register

;----- Print crlf and return.  Can be called as separate subroutine.
newline:
        lea     dx,crlf                 ;dx = address cr lf ASCII$ string
        dosfn   9                       ;print string
        ret                             ;return to caller
print   endp
page
;---------------------------------------------------------------
; TEST
;---------------------------------------------------------------
; Purpose       -- perform test -- enter characters until
;                  set of characters typed equals expected
;                  set of characters.  Repeat test if any
;                  extra characters are accidentally typed.
;
; Called by     -- main program
;
; Calls         -- sets
;                  print
;                  report
;
; Arguments     -- (ds:si) - address of test string
;
; Registers     -- ax,cx,dx,di destroyed
;---------------------------------------------------------------
dseg    segment byte public 'data'
chset   set<>                   ;set of characters entered
doneset set<>                   ;set of characters expected
dseg    ends
```

```
test    proc    near
        push    si                      ;save si in case test repeats
        call    print                   ;print test string
        lea     di,doneset              ;di = address of doneset variable
        setfn   4                       ;doneset <- set of chars in string
        lea     di,chset                ;di = address of chset variable
        setfn   10                      ;make chset = null set []
        lea     si,doneset              ;preset si = address of doneset
test1:
        dosfn   1                       ;get and echo char (ch in al)
        mov     dl,al                   ;transfer char to dl
        setfn   8                       ;insert dl into chset at (di)
        xchg    si,di                   ;si=chset, di=doneset
        setfn   6                       ;test for doneset <= chset
        xchg    si,di                   ;si=doneset, di=chset
        jne     test1                   ;jump if doneset
                                        ; not a subset of chset

;----- Report results of test, and repeat same test on any errors
        call    report                  ;check and report results
        pop     si                      ;restore si register
        jz      test                    ;repeat test on any errors
        ret                             ;else end test
test    endp
page
;---------------------------------------------------------------
; REPORT
;---------------------------------------------------------------
; Purpose       -- report results of test.
;
; Called by     -- test
;
; Calls         -- newline
;                  sets
;
; Arguments     -- doneset (in test dseg) = expected char set
;                  chset (in test dseg) = chars entered
;
; Registers     -- ax,dx,di,si destroyed
;                  zf = 1 if extra chars entered (use jz)
;                  zf = 0 if entry was perfect (use jnz)
;---------------------------------------------------------------
dseg    segment byte public 'data'
repmsg  db      'Extra chars = ','$'
noerr   db      'none',cr,lf,'$'
error   db      ?
dseg    ends

report  proc    near
        mov     error,false             ;error flag <- false
        call    newline                 ;write a blank line
        lea     dx,repmsg               ;prepare to print report message
        dosfn   9                       ;print string
        lea     di,doneset              ;di = address of doneset
        lea     si,chset                ;si = address of chset
        setfn   2                       ;doneset <- chset - doneset
        mov     dl,32                   ;dl = ASCII first char to check
rep1:
        setfn   0                       ;set membership for value in dl
        jz      rep2                    ;jump if dl not a member of doneset
        mov     error,true              ; else flag the error
        dosfn   2                       ; and print the extra character
rep2:
        inc     dl                      ;next char to test
        cmp     dl,128                  ;loop while dl < 128
        jb      rep1
        lea     dx,noerr                ;prepare to print "none" message
        cmp     error,true              ;check error flag
        jne     rep3                    ;jump if no errors detected
        lea     dx,crlf                 ;print crlf if errors found
rep3:
        dosfn   9                       ;print ASCII$ string at dx
        call    newline                 ;write two blank lines
        call    newline
        cmp     error,true              ;set flags before returning
        ret                             ;end test / report
report  endp
cseg    ends                            ;end of segment
        end     settest                 ;end program
```

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The great communicator

Peggy Straube looks at document-exchange interfaces which help business computers speak the same language and can enhance the productivity of installed equipment

In the computer industry, which is well known for making technological advances that render previous equipment obsolete, a new product has been developed that can actually enhance the productivity of already installed equipment. Via document-exchange interfaces, documents created with incompatible word-processing software can now be exchanged between different hardware systems, potentially eliminating the need for a business to standardise on equipment from one vendor.

A company's various departments often need to exchange memos, letters or reports. If they use different word-processing systems, the information has to be rekeyed or sent via paper mail, a solution that negates the point of an automated system.

With a document-exchange interface, however, Susan in accounting, who works on an IBM Displaywriter, can send a file to Larry's IBM PC in personnel. After Larry edits the document, he can send it to Herb's Wang dedicated word processor in the benefits office.

Such convenience is not inexpensive although this constitutes but a small part of the million-dollar systems into which a document-exchange product is likely to be incorporated.

IBM's document-exchange interface uses *Distributed Office Support System (DISOSS)* software, a store-and-forward system on the IBM 370

mainframe, with a System/36 minicomputer as a sort of traffic manager that stores and sends documents. *DISOSS* incorporates IBM's Document Interchange Architecture (DIA) and Document Content Architecture (DCA).

DISOSS allows users to exchange documents among a variety of IBM machines, including the PC, the System/36, the Displaywriter, and departmental systems, such as the 8100 and the 5520. In addition, several *DISOSS*-based third-party products allow documents to be exchanged between IBM machines and systems that use Wang, Digital Equipment Corp., Data General and other non-IBM machines.

According to an IBM spokesman, the way *DISOSS* works is similar to the way a post office functions: it looks at the mail that comes in from a variety of devices and decides what needs to be forwarded to whom.

DISOSS can also copy a document and send it to a number of recipients. When the document is forwarded, *DISOSS* confirms the delivery or notifies the sender of unsuccessful attempts at delivery.

If *DISOSS* is the post office, DIA is the envelope that is addressed in the standard manner that all mail carriers recognise. *DISOSS* depends on DIA for storage, retrieval and distribution of *DISOSS* documents from a document library in the mainframe. DIA defines the rules for processing documents in a network and provides a single way of addressing the recipient that the host is able to understand regardless of the machines involved.

DCA provides the rules for interpreting the documents being exchanged in the DIA "envelope." DCA enables all the machines in the network to conform to a series of conventions for setting tabs, line endings and other format factors so that when a document is sent, the machine at the other end will understand the format and keep it intact.

DCA also specifies whether the text transmitted will be in revisable or final form.

In revisable-form DCA documents, the formatting declarations appear as individual structures separate from the text. This allows users to make changes to the text while retaining the original formatting constructs, such as margin sets and tab spacing.

In final-form DCA documents, the format declarations appear as text. This mode allows users to exchange formatted documents but not to revise them.

To provide the rules for information flow and processing in IBM office-systems networks, DIA and DCA work together with IBM's System Network Architecture (SNA), the company's mainframe-based data-transfer protocol. "If you take all the terminals and all the hosts and draw lines between them, and connect those lines with some type of schematic that would resemble a telephone network, SNA is the communications server that allows for any terminal on that network to physically start the communications sessions," an IBM spokesman said. SNA is the communications backbone of the network, and because *DISOSS* has no communications capabilities of its own, it depends on SNA to send data in and out of the host. According to the spokesman, "*DISOSS* is strictly a non-ending program sitting in a 370 host that receives and transmits data."

Because documents are sent via the System/36 minicomputer, where they can be stored until the recipients are ready to retrieve them, users can send documents at any time. "The burden of delivery is on the post office," said the spokesman. "The alternative to *DISOSS* is doing a direct-dial point-to-point of a PC to a PC, in which case both users need to synchronise their time, their modems, their systems and what have you for a transmission. *DISOSS* allows the burden of delivery to be put on the host system and begins to get around the problem of manual intervention, multiple time zones and multiple continents."

The ability to exchange documents between different systems is part of IBM's goal of integrating its office-automation products. In 1981, the company declared its intent to allow users to exchange and edit documents across all its office products. It was a step toward enhancing office productivity by allowing users to choose the system size that best met their needs without having to worry about being able to transfer documents to other systems.

The importance of *DISOSS* is skyrocketing as more and more companies demand multivendor systems that work together. In particular, users need word processors that are compatible with their other office equipment, and since so many firms have chosen the IBM PC as their standard, IBM compatibility is the key. This gives *DISOSS* the potential to become the standard for electronic-office-equipment interface, because in addition to being a key element in IBM's office-automation strategy, it provides opportunities for

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communication between PCs and non-IBM machines.

This means that, to penetrate the IBM market, several document-exchange vendors are making their products *DISOSS* compatible. These products will enable other vendors' machines to exchange documents with machines on a *DISOSS* network and with each other.

One consultant who has seen a definite trend in that direction is Amy Wohl, president of Amy D. Wohl & Associates, a consulting firm specialising in office automation. "If I'm *DISOSS*-compatible and you're *DISOSS*-compatible, it becomes . . . an exchange medium even though we weren't trying to be compatible with each other. We were each just trying to be compatible with IBM," Wohl said.

Document-exchange interfaces present DP and MIS with an alternative when they cannot satisfy user demands with any single product. It provides a solution to the problem of standardisation and salvages substantial equipment investments by allowing a company to maintain its installed equipment base for several more years.

Although they give users an alternative to standardising or purchasing dedicated word processors, document-exchange interfaces have been criticised as "Band-Aid solutions." According to Wohl, "They're certainly a Band-Aid solution in the short run. In the long run, though, you continue with Band-Aids because you may have the need to satisfy several different kinds of word processing, or you may need to maintain an existing base of equipment as you add new equipment . . . They are a migration path rather than a Band-Aid."

In either case, users are greeting *DISOSS* and *DISOSS*-based products with open arms. As IBM moves to unite all the pieces of the automated-office puzzle, it is also giving other vendors an additional opportunity to make IBM-compatible products. ■

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Ogilvy MCQ 0048 R

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3 **Eye comfort:** ADE-55 with dark face screen gives you eye comfort so that eye strain is minimal in long work sessions.

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6 **Picture quality:** Compare picture linearity, geometric distortion and steadiness with any other monitor, and you can hardly fault the ADE-55

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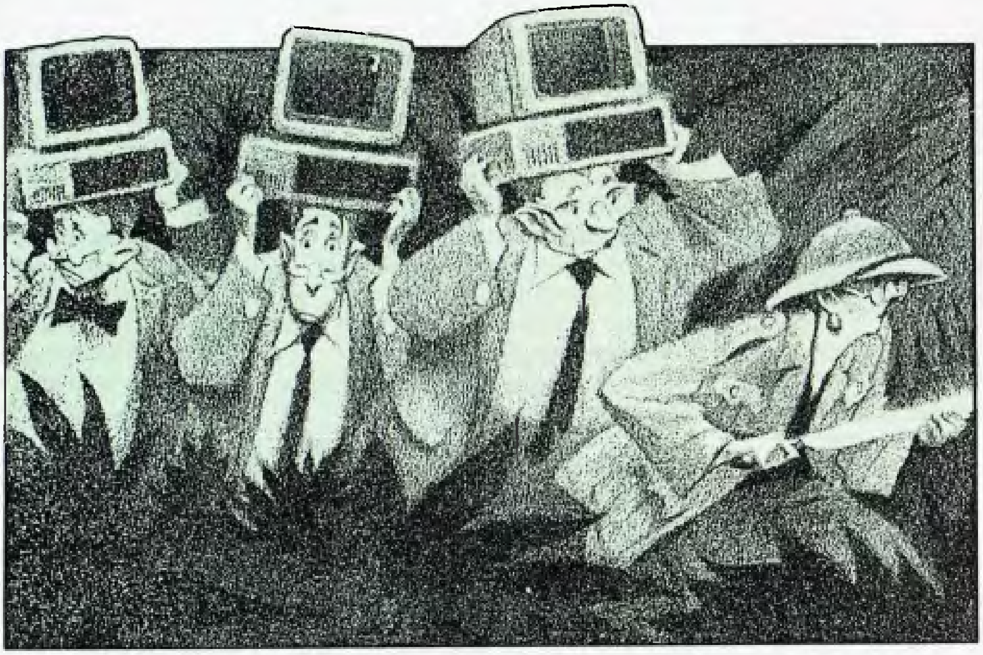
8 **Choice of stand:** ADE-55 for your option is available with 360 degrees swivelling and tilt 30 degrees upward and downward. Easy to adjust for human engineering purpose.

9 **Price:** With so many functions provided and with such high quality you can find the ADE-55 is not only superior to, but also more economical than any other monitor in the same price range. If you select ADE-55, you are buying quality and price.

Note: Special OEM and Dealer Prices Apply!

ADE Computers Pty. Ltd. (INC. IN VICTORIA)
28 HAUGHTON ROAD, OAKLEIGH, VICTORIA, AUSTRALIA 3166
TEL. (03) 568 7877 TELEX AA36384 ADE H.Q.

Who takes the RISC?



Can lightning strike twice? It struck IBM once with the market's overwhelming acceptance of the PC. Now, with the introduction of the RT, IBM has very carefully recreated the conditions to spark another market success. But as scientists and engineers — the ostensible market for the new machine — know, it is not always possible to reproduce natural phenomena in a controlled environment.

The IBM RT's genesis resembles that of the PC in many ways. Both represent departures from IBM's existing technical directions and product alignments. Both were created by independent business units outside the company's mainstream development centres. Both are sold through non-IBM distribution channels. Both are open systems that third-party developers can use as a platform. Both were seemingly targeted at users outside IBM's traditional markets.

But can the RT ignite the electricity the PC ignited? According to an IBM spokeswoman, the Unix-based machine is aimed at "technical professionals in industry, academia and government." IBM estimates there are three million users in the US work force who fit that description. But market analysts point out that the machine's innovative RISC (reduced-instruction-set-computer) microprocessor and virtual memory management software equip it for a broad range of other markets.

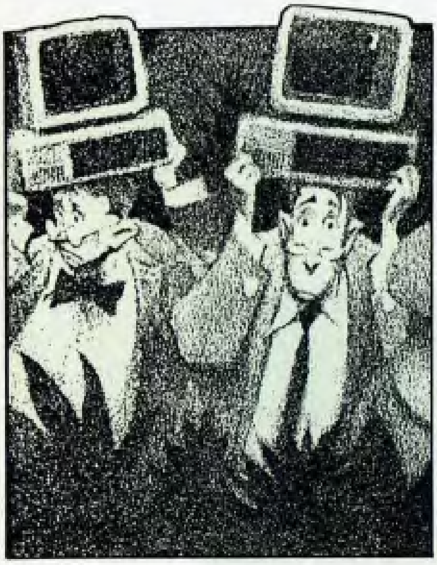
As IBM's first real Unix offering, the RT has potential for small-business multi-user environments. As a high-performance desktop computer, it can be sold aggressively in the academic community. It also can serve as a general-purpose CAD computer, an artificial-intelligence workstation or a platform for a desktop publishing system. The RT could emerge as IBM's solution to its bottleneck in mid-range business computing. In this scenario, it might be positioned as the machine that ties together IBM's conflicting PC and 370 architectures.

Like the PC, the RT is designed with an open architecture — a decision that limits IBM's ability to single-handedly dictate market positioning. To a very large degree, the machine's market future depends on the actions of third-party hardware and software manufacturers.

At the heart of the RT is a RISC microprocessor that executes 1.6 to two million instructions per second, roughly twice the performance of the 80286 chip in the PC AT. This is achieved because it executes just 118 native instructions, many in a single 170-nanosecond machine cycle. Conventional processing units may have twice that many instructions programmed in microcode, including complex operations that require multiple cycles.

Most of the attention to RISC has centred on the attribute that provides its name: reduced instruction sets.

The theory behind RISC is that



most computers use about 20 per cent of their native instructions to perform most operations, yet the speed of the processor is slowed down by the overhead of the unused instructions. Thus, by limiting the range of operations to a set of simple instructions the processor can perform most of them in a single cycle, thereby boosting performance.

But there is more to RISC than reduced instruction sets. The RT PC and other RISC designs take advantage of the inherent efficiency of the processor, using a special compiler program by optimising traffic between the processor and the memory and by efficiently using virtual-memory techniques.

Implementing the RISC idea requires a close partnership between hardware and software. Since more individual steps are required to complete a high-level program request, a compiler — a special program that translates high programming language into machine language — works to manage the order of computation to minimise delays.

The compiler does this by using internal storage registers to temporarily store results that will be reused, minimising the need to access main memory. The compiler also permits some instructions to be executed concurrently instead of one after the other.

To increase memory access times, the RISC design provides separate paths between the processor and memory for data and instructions. Each path has its own small, fast buffer to store data and instructions that are frequently used. RISC machines use a virtual-memory technique to provide access to data stored on disk as if it were resident in memory. This is done by maintaining a table of virtual addresses in RAM, allowing information to be retrieved from a hard disk more quickly.

RISC computers improve the maximum size and performance of the virtual-memory technique used on other machines. Virtual systems are limited by the number of bits the processor can handle at one time. In a 32-bit computer, like the RT, a maximum of four billion bytes of data can be addressed under normal conditions. The RT uses a special set of registers to expand the word length from 32 bits to 40 bits, providing access to 250 times as many disk addresses, or one trillion bytes of data.

To manage such large address tables which might otherwise degrade performance by consuming an excessive amount of memory, the RT uses a dual-stage virtual-memory mapping technique. There are two address tables in main memory, one that indexes addresses of the second table and one that indexes those on disk. Since the table size is proportional to real-memory addresses, not disk addresses, it stays manageably small.

The RT's operating system, the Advanced Interactive Executive (AIX), allows eight users to share the machine. AIX's use of virtual memory means the applications are not bound by the size of physical memory on the RT because a larger memory is simulated than actually exists. A Virtual Resource Manager (VRM) program works with the Memory Management Unit chip to allow any application or operating system to access as many as a trillion bits of virtual memory.

Moreover, the RT design has several features that connect it to the DOS environment. It supports an AT coprocessor board that allows DOS applications to run concurrently with AIX applications. The VRM system permits these programs to share file space on the same hard disk. Also, the AIX operating system can run in a DOS shell, permitting users to call Unix functions with DOS names.

The RT is available with various configurations of RAM, mass storage and expansion slots. The least expensive version of the RT begins at $30,000 but a fully configured system is likely to cost almost twice as much.

The RISC chip's main competitor is the Motorola 68020, which is used in most engineering workstations. The RT executes instructions almost twice as fast as the 68020 but has to process more instructions to accomplish equivalent high-level tasks. On that basis alone, technical observers consider their performance to be about equal. On price, however, the RT is clearly more expensive.

A complaint about the RT is its lack of an Ethernet connection. IBM has announced support only for the PC Network. Most analysts believe, however, that the machine will run on IBM's Token-Ring Network when a high-speed backbone for that network is introduced. The AIX Unix implementation includes the basic features of Unix System V with enhancements from Berkeley 4.2 and from Interactive System's IN/ix. (Interactive codeveloped AIX with IBM.)

Much will depend on how IBM expands the system. The initial versions are at the low end of the performance spectrum among engineering workstations. Additionally, many analysts expect the machine to move in a horizontal direction. IBM's selection of supported software for the RT suggests some intriguing possibilities. The majority of the initial catalogue offered is aimed at scientific users.

Software was also announced for related fields, such as CAD/CAM and desktop publishing. Major manufacturers of expert-system shells, CAD packages, project-management systems and database software have announced RT products. All of these products seem appropriate for a computer for technical professionals. But other developers are offering products with an eye toward business applications of the machine. For example, a version of Comshare's System W decision-support software is available for the RT.

Samna Corp.'s word-processing software is another IBM selection with dual possibilities. Samna has made its mark in the PC-DOS world as a business word processor with many features. As one of the few PC editors which supports math symbols and Greek characters and contains an integrated spreadsheet, Samna may seem like a logical choice for technical users. Many scientists may prefer a stripped-down editor to an office-oriented word processor, however.

If IBM has such grand plans for the RT, why will it initially limit it to a relatively narrow market? "This is safe positioning," says Jan Lewis, president of the Palo Alto Research Group, in California. "If they had come out and said that this was a personal publishing engine or a super gateway, and the market didn't accept it, they could have lost momentum." She thinks it will be a quick winner in the engineering market, "because the competition is well defined and vulnerable."

Other analysts have speculated that IBM restricted the machine to a limited market in an effort to defeat compatible manufacturers. They claim the machine's success depends on the development of value-added software, but that attracting it required keeping the RT out of the mass market, where imitations would quickly bloom.

Despite this slow-start strategy, IBM will eventually migrate the machine to other environments but by then the RT will have had an opportunity to flourish and withstand the inevitable price pressures. If all goes according to plan, IBM will duplicate the astounding success of the PC line but won't have to share the profits with as many hangers-on.

The PC phenomenon was a spontaneous occurrence. It remains to be seen if IBM can make lightning strike twice. ■

The PC Solution

The Better Alternative is the NCR range of personal computers which runs the whole range of industry standard software. That's just the start! With an NCR PC you also get:

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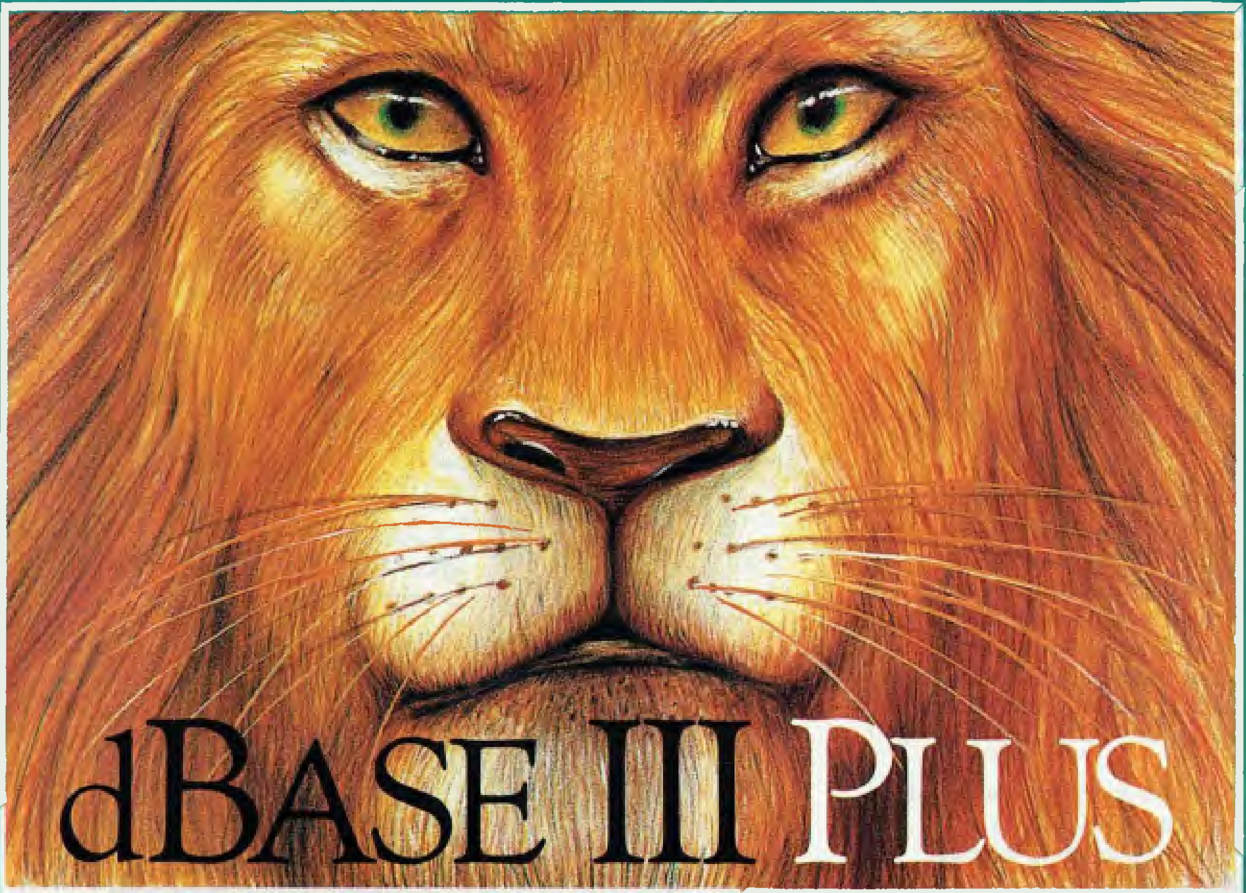

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New products

Communications tester

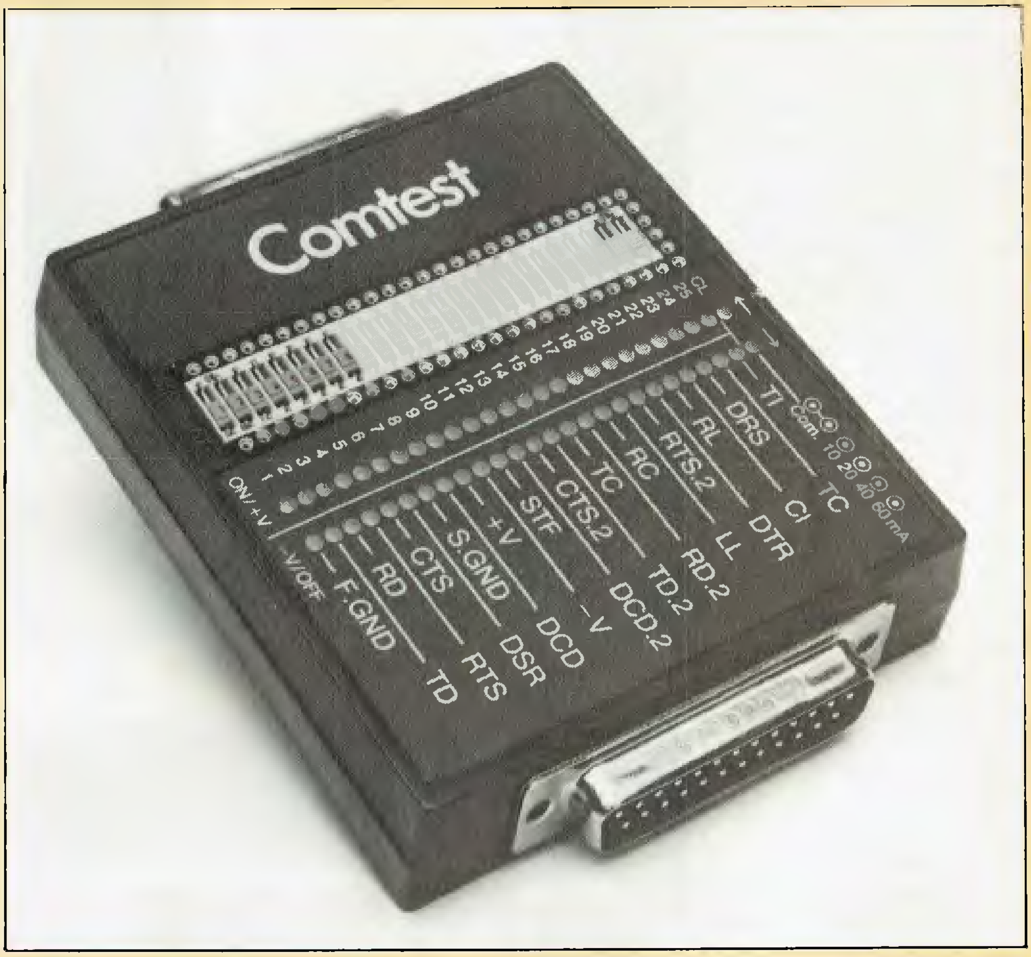
The Comtest is a complete RS 232/V24 interface with open circuit voltage and current loop tester. It is designed for engineers, computer salesmen and those who install, repair and use RS 232 communications equipment.

The Comtest has 25 dual line switches with DTE-DCE interface pins on both sides and can break and cross patch all 25 lines with switches and jumper cables supplied.

There are simple instructions on the unit and a guide to all signals with CCITT and EIA abbreviations. The Comtest is in a moulded plastic case, weighs 110 grams and measures 102 x 79 x 18 mm. It does not need batteries.

Comtest

Motivation Plus
12 Fetherstone St
Bankstown, NSW 2000
tel: (02) 707 1126



Comtest: a handy gadget for computer salesmen and engineers

Sperry enhances Usernet

Sperry has made major enhancements to its Usernet local area network system. The improvements include expanded models of data/print servers, network operating system software which allows a single server to support up to 50 active users, IBM 3270 SNA server software, archival tape backup system, advanced application software and a simplified network bus.

First introduced in 1984, Sperry's Usernet is a local area network which allows data applications and peripherals to be shared among a community of PC users. Usernet allows any PC to be used as a data/print server, to monitor workstations and to act as the central storage device for data and application programs.

Two versions are available: DS 200 for configurations needing less than 20M of disk storage and the DS 220 for networks requiring expansion to 180M per server. A Usernet system can grow from a single data/print server and its attached hard disk, printers and workstations up to eight data/print servers with a mix of peripherals all connected to the network trunk cable.

Usernet Software/86 network operating system runs under any version of MS-DOS and includes support for multiple servers with a combined maximum of eight data/print servers and communications servers and electronic mail. A copy of Software/86 is required for each server.

Sperry's archival tape subsystem is a free-standing cartridge tape unit with a capacity of 64M. It will back up only those files which have been altered between archiving sessions thus improving performance over streaming tape drives which take a full mirror image of all data stored on a disk drive. The tape subsystem also offers the flexibility to create directories and files on tape.

Sperry's 3270 SNA Protocol Communications Server software allows users of IBM-compatible PCs connected via Usernet to operate under IBM's SNA communications protocol and emulates the 3270 cluster controller, offering communication facilities without adding or changing any host system software.

Workstations and servers can be connected to the bus network by twisted-pair wire trunk cable and a unit can be removed without any disruption.

Usernet

Sperry
Level 40
100 Miller Street
North Sydney, NSW 2060
tel: (02) 929 7800

RealWorld accounting software on IBM Xenix

HyTech Computer Solutions says it has completed the porting of the Australianised version of all *RealWorld* accounting modules to run on the IBM/PC-AT under the multi-tasking Xenix operating system.

The modules available are: accounts receivable, order entry/billing, inventory control, sales analysis, accounts payable, general ledger and job costing.

Hytech says all users of the IBM/PC-AT, or compatibles, can upgrade their systems simply and inexpensively to full multi-user, multi-tasking facilities and install the comprehensive *RealWorld* accounting modules.

The company says the Uniplex Office Automation package will, in future, be fully integrated to the *RealWorld* accounting system running under Unix 5.2 and Xenix.

RealWorld

Hytech Computer Solutions
PO Box 197
Kenmore, Qld 4069
tel: (07) 378 0700

RealWorld accounting software for just about all financial operations

New program design tool

A program design tool which is claimed to dramatically increase programmer productivity while cutting program maintenance costs has been released. The package, Stylus, automatically forces correct structured programming style while providing program documentation. It has been released by Grouse Bell and Associates of Sydney.

Stylus allows full-screen editing of a graphical display of a program source code. Structured programming statements such as Call, While and If-Then-Else are diagramatically represented on a PC using color to show the scope of each statement.

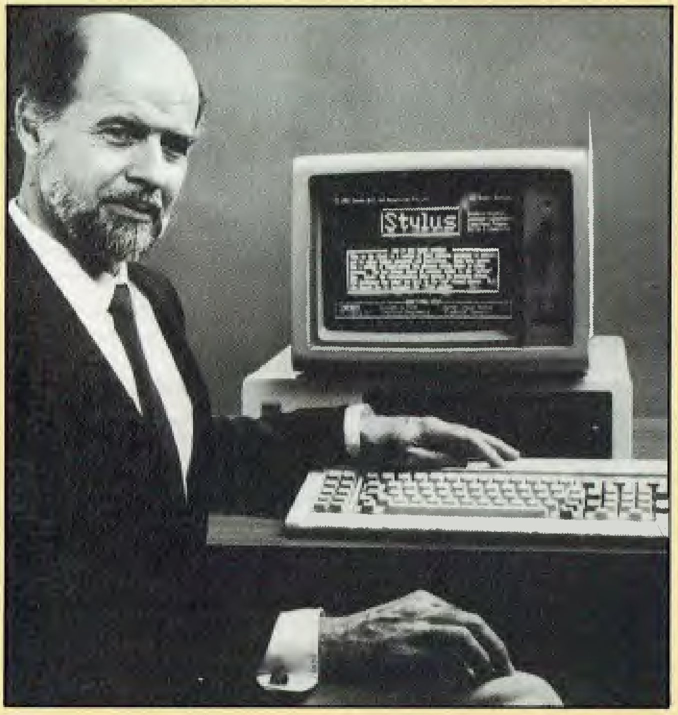
Once a program has been edited in this form, it is saved and then passed through a translator program which converts it into conventional source code in the target language. The first three translators to be released are for the BASIC, PL/1 and dBASE II languages. Other translators are scheduled for early release.

Stylus is said to support good, structured, program design practices, break large programs up into modules automatically, build documentation into the source code, and support the structured set of flow control statements.

Stylus will run on an IBM PC or compatible with 192K of memory. A color screen is preferred, but it will run on monochrome systems.

Stylus $150

Grouse Bell and Associates
PO Box 297
Neutral Bay Jn NSW 2089
(02) 908 3458



Phil Grouse demonstrates the new structured programming tool, Stylus

Backrest gives data support

Unlike other 'back-up' programs, *Backrest* provides more than just file copying and splitting. It is an advanced file recovery management system for the office which needs data security. With *Backrest* you can back-up and restore individual files, databases, DOS sub-directories, CP/M user areas, or the entire hard disk. *Backrest* will back-up new or modified files so you can run quick incremental back-ups on a routine basis to ensure that you always have another way of getting to your data.

Unique back-up routines can be pre-defined for flexible control, allowing individuals in a large organisation to define their own specialised back-up procedures.

Backrest $270

PC Accessories Pty Ltd
PO Box 374
Turramurra, NSW 2074
tel: (02) 449 4721

Laser printer from Facit

The Facit Opus 2 laser printer is designed to bring down the cost-per-page in letter quality applications. With a life-time of more than 600,000 pages, it produces eight pages a minute with a character resolution of 300 x 300 dots. Paper and stacker trays have a capacity of 250 sheets each with the printed sheets being stacked in the correct order.

A total of 16 fonts can be used on the same page and four basic fonts are included which can be modified. Additional fonts can be loaded from the host or from cartridges inserted in the printer. The graphics capabilities of Facit Opus 2 include raster, line and box drawing for the creation of graphics and forms.

Parallel and serial interfaces are standard along with the Diablo 630 command set. Applications for Facit Opus 2 include serving a single or several PCs in a network.

Facit Opus 2

Ectron-Eai
Unit 4, 2 George Place,
Artarmon, NSW, 2064
Tel: (02) 427 3322

Facit Opus 2: letter quality applications for more than 600,000 pages

RAMpage! passes compatiblity tests

Extensive testing of RAMpage!, an expanded memory board from Sourceware, has confirmed its full compatibility with new Lotus software packages. Tests performed by the Lotus Development Corporation endorse the compatibility of *Lotus 1-2-3 Release 2* and *Symphony 1.1* with RAMpage!.

RAMpage! developed by AST, was tested on an IBM PC/XT under PC DOS 3.0, with 2M of installed memory and the RAMpage! Expanded Memory Manager.

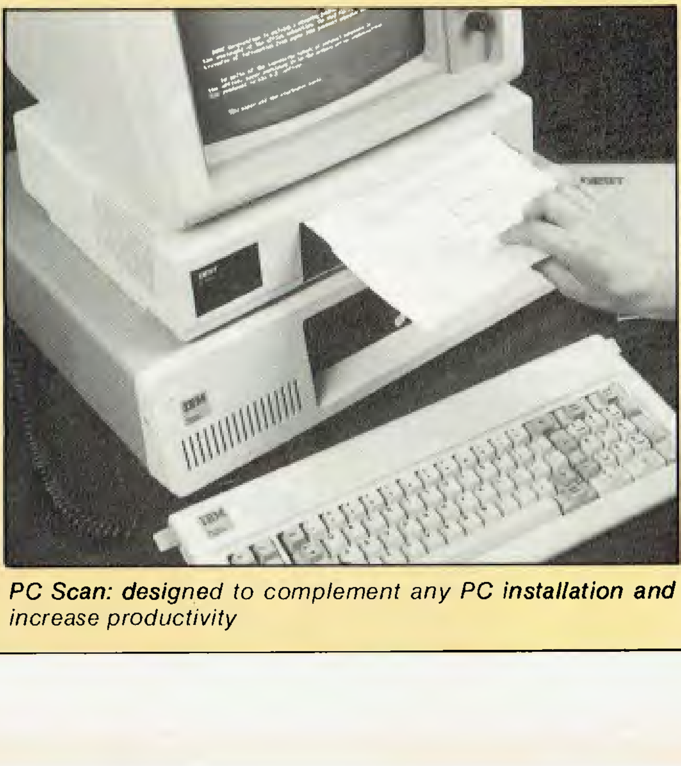
The RAMpage!/Lotus combination offers increased memory capacity and performance for large spreadsheet and multi-tasking software programs. RAMpage! breaks through the PC DOS barrier of 640K, offering up to 2M of "paged memory" for faster performance of application and multiple programs.

The *Lotus 1-2-3* upgrade features: a 4M RAM capacity, hard disk installation, the ability to run multiple programs or return to the operating system without exiting *1-2-3*, password protection, and the use of *1-2-3* on a local area network with shared resources.

Supporting more than 4M of memory, *Symphony 1.1* offers a combination of five business software applications — spreadsheet, word processing, database manager, communications and graphics.

AST RAMpage!

Sourceware Pty Ltd
586 Pacific Highway
Chatswood NSW 2067
(02) 411 5711



PC Scan: designed to complement any PC installation and increase productivity

Teach your PC to read

PC-Scan, an optical character reader from Remington designed to complement any PC installation, increases productivity by automatically reading typewritten text and converting it into a form the PC understands.

PCs are usually bought to improve office efficiency but the process of keying information in has not changed significantly since Remington launched the first practical typewriter in 1873.

By removing the keyboard bottleneck, *PC-Scan* offers an input system that matches the processing and output speeds of a PC. It scans a standard typewritten page (up to 8.5 x 11 inches) in 25 seconds (thirty times as fast as the average typist) and talks to virtually any word processing package in its own language.

The input document appears within a document on the PC just as if it had been typed in and the test can be manipulated with your chosen word processing program.

Because *PC-Scan* can read all the popular fonts including monospaced and proportionally-spaced styles, text can be created on any typewriter, making the ordinary office machine into a data/text capture unit.

PC-Scan is a 16 x 11.5 x 4 inch box that fits neatly between a PC and its screen, and is operated by 'posting' the required document into the front slot.

PC-Scan

Remington Pty Ltd
GPO Box 542
Sydney NSW 2001
(02) 269 0925

Waving the flag

The British electronics company, Ferranti, has launched a family of computers which, the company says, are designed to run virtually every IBM software package and a wide range of operating systems: MS-DOS, Unix, Venix, Xenix and Pick.

Two ranges of machine are available: the 2860 range of AT compatibles; and the 860 models providing IBM PC and XT compatibility. The Ferranti PC 2860-AT has been designed to answer the requirements of expanding organisational, business and educational markets. It offers 640K of memory, V24 and parallel interfaces on the main system board, and two running speeds, 6MHz, and 8MHz. The speed is simply switched from the keyboard with an LED indicator on the front of the machine.

The PC 2860-AT has many extras, including an extensive suite of software, with MS-DOS and GW-Basic and the complete Perfect II package. This includes a word processor (dictionary and thesaurus), a spreadsheet and a data management package.

The speed of its processor and the way it handles the more complex graphics and software, means the 2860 can use the wide selection of present and future software the IBM PC-AT is attracting. A wide range of local area networks can be utilised by inserting the appropriate communication card, and in a file server role, it has the power and storage capacity to act as a central store holding programs and data, with a choice of PC 860, 860-XT or 2860-AT outstations.

The Ferranti 860 PC and XT use the 8086 running at 4.77 MHz, allowing internal processing at higher speeds — up to 5.7 times faster.

The Ferranti PC comes with two 360K floppy drives as standard, while the XT is available with one floppy and a choice of 10M or 20M hard disks. The standard unit includes five interfaces: two video drivers — composite video and one RGB; a serial RS232-C; Centronics parallel and a joy-stick port.

The PC 2860-AT from Ferranti — soon to be manufactured in Australia

PC 860 $2395
Ferranti Computer Systems
22 Mandible St
ALEXANDRIA NSW 2015
(02) 698 5544

Medical database package

Sydney-based consultancy and software publisher, Medix Software, has released its *Clinic* package for doctors, specialists and hospitals.

Clinic, a patient clinical reord keeping program, is designed for the free-text entry of case histories and progress notes, with emphasis on keyword retrieval according to the doctor or clinic's own requirements. It features extensive reporting, on-line assistance in entering and retrieving patient records, and on-line access to specific history and patient progress notes. An optional patient billing and receipting module should be available by the middle of 1986, and overseas distribution will follow. *Clinic* is available for the IBM PC and close compatibles.

Clinic
Medix Software
PO Box 1308,
Chatswood, NSW 2067
tel: (02) 449 9162

Teaching guide for AutoCAD

An illustrated guide for users of AutoCAD microcomputer-based design and drafting software is available from Comprador Business Systems.

'Inside AutoCAD', written by graphics experts Dan Raker and Harbert Rice, is a detailed step-by-step guide to AutoCAD that enables the user to draft professional quality drawings and designs in the shortest possible time.

The handbook contains many practical tips that will help both first-time and seasoned users of AutoCAD save time and money.

Inside AutoCAD $55
Comprador Business Systems
90 Warren Rd
Smithfield NSW 2164
(02) 681 4000

New IBM compatibles

Dicker Data Projects Pty. Ltd have introduced a new range of IBM compatible computers. The "Compatible" PC/XT and PC/AT offer significant cost reduction and performance features over the standard IBM.

The Compatible PC/XT has an eight slot motherboard with an 8088 CPU running at 4.77MHz. An optional "Turbo" motherboard is available with an 8MHz processor that can be switched from 4.77MHz operation to 6.77MHz operation. The motherboard supports an 8087 co-processor running at 6MHz.

The PC/XT comes with 640K of RAM and a serial and two parallel ports, real time clock and games port. There are enough power connectors to run four disk drives internally. It can be configured with a color graphics card or a high resolution mono graphics card (Hercules compatible) in the standard configuration. In text mode the high resolution mono graphics card has a character cell of 9 x 14 dots with a display of 80 columns and 25 lines. In graphics mode the resolution is 720h x 348v with a 2K static RAM buffer to eliminate scrolling flicker. The color graphic card has a resolution of 640 x 200 in mono or 320 x 200 in four colors.

The PC/XT can be configured with single or dual floppy disk drives, or a 10M or 20M disk, and has a 130W power supply with a built-in cooling fan.

The Compatible PC/AT uses the Intel 80286 processor and provides a three times speed improvement over the Compatible PC/XT. The Compatible PC/AT has a 6MHz 80286 with and optional 8MHz processor that can be switched to 6MHz. An optional 80286 co-processor can be installed on the motherboard. The PC/AT has 640K of RAM standard with the ability to support 1M of RAM on the motherboard. It has an eight slot motherboard, serial and parallel ports and real time clock.

Compatible PC/XT
$2995 (ex tax)
Dicker Data Pty Ltd
78 Captain Cook Drive
Caringbah NSW 2229.
(02) 525 2122

Unleash the power of a Mainframe on your PC

Forte® brings the power of a mainframe to your desk, lets it talk to your PC, listen to your PC and more. With the Forte family of communications hardware and software, your PC becomes a powerful extension of the mainframe, freeing valuable mainframe resources.

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Put simply, Forte lets your PC unleash the power and features of the mainframe, transferring large database files to and from your PC and even down loading mainframe graphics. But above all, Forte reduces the cost for each connection to the mainframe giving all of the benefits of the IBM SNA environment at a fraction of the cost.

So if you're serious about distributing the power of the mainframe to the users, come and join us at our next free Forte seminar. To reserve your place or for further information about the Forte family, call Software Corporation of Australia today:

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Sydney (02) 211-4099,
Brisbane (07) 300-1978.

Forte SCA

SOFTWARE CORPORATION OF AUSTRALIA

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BLAIR COM 1963R

Portable IBM PC compatible

Zenith Data Systems has added the portable Z-171 PC to its range of IBM PC-compatible personal computers. Weighing less than seven kilogrammes and measuring 24 × 33 ×17 cms the Z-171 is designed to fold up, forming its own carrying case. Additional protection comes from an optional lightweight carrying case.

The Z-171 runs on 120/240 V 50/60 Hz or an optional battery pack. It features 256K RAM (expandable to 640K) and provides a unique 25-line by 80-column flat panel backlit LCD screen with adjustable controls. Its DIN standard 63-key sculptured keyboard includes a full 22-key calculator pad overlay.

The Z-171 uses an 80C88 CMOS 16-bit microproccessor supporting MS-DOS 2.11 and 1.25 operating systems. Its dual floppy disk drives allow the user to access and exchange data with the growing volume of 16 bit software developed for IBM PC-compatibles. Built-in software includes a telephone directory, monthly calendar, calculator, work scheduler and world map for executives.

Z-171 $4995.

Anitech
1-5 Carter Street, NSW 2141.
Tel: (02) 648 1711

Zenith Data Systems: its new IBM PC portable compatible

Document storage

PC Accessories Pty Ltd, agents for Signum Microsystems Inc, announce the arrival in Australia of Documax/PC, a document storage and retrieval program. It allows the user to organise documents and to find items of interest quickly and easily. The key features are an ability to search the full text of any file conforming closely to ASCII or EBCDIC standards, scan or browse through documents in rapid succession, and compress text files to half their normal size.

In addition, Documax lets you search or display files from virtually all word-processing programs, files acquired from information services or by electronic mail, and files created by many database programs.

Documax scans the full contents of files directly at more than 100,000 words per minute and any text in a file can be found. Furthermore, the files can be searched in their original form so no pre-processing is necessary and no list of keywords need be formed. Whenever a document is created, it can be treated as part of your text database. With Documax you can scan quickly through an arbitrary number of documents similar to flipping through items in a filing cabinet drawer. You can pause at any time to read a document and print or save portions of it.

Making a Documax search you can specify the amount of context surrounding each phrase, and in a 'flex search', include searches for phrases within documents that are not an exact match, but 'close enough'.

Commands important to each phase of each function are always displayed. Documax also manages document files without you having to type in document names and lets you copy files between directories, delete and rename files, and lets you create subdirectories in order to organise document files without having to leave the program.

Documax/PC $250

PC Accessories
PO Box 374
Turramurra, NSW 2074
tel: (02) 449 4721

Support for the EGA

Software Corporation of Australia says the ForteGraph S3G graphic product now supports the IBM Enhanced Graphic Adaptor (EGA) monitor. ForteGraph is compatible with a range of mainframe graphics software. It allows users to print mainframe graphics on a microcomputer and to transfer and store mainframe graphics to a PC-DOS file. It includes the ability to print mainframe graphics on a PC, to transfer and store mainframe graphics to a PC-DOS file, and to recall graphics off-line from the mainframe.

ForteGraph S3G emulates the IBM 3279 S3G terminal, providing compatability with a vast library of mainframe graphics software which includes SAS/GRAPH, GDDM and ISSCO's TELLAGRAF. In addition, ForteGraph S3G supports Forte ForteNet file transfer program and Forte FTS software, a file transfer utility that provides access to IBM's file transfer and PROFS/PC software. ForteGraph S3G is soft-loaded from disk, eliminating the need for PROM replacements or any other hardware modifications.

ForteGraph S3G

Software Corp. of Australia
138 Buckhurst Street
South Melbourne, Vic. 3205
tel: (03) 699 7255

Videotex package improved

Metrotel IPT has been enhanced for new hardware and provides file-locking for networks, so more than one editor can access a common videotex file. The software supports DOS 3.1.

The major benefit of this release is that it incorporates the network file locking, which is essential to multi-user applications. The Metrotel IPT automates the maintenance of large videotex databases. It includes offline editing which allows block moves, word wrap, full margin and tab control. It supports faster and more powerful IBM compatibles (which ensures Metrotel IPT will run on IBM standard local area networks), IBM AT's and compatibles, and gives full videotex characters on the Olivetti M24.

Other features are support for the IBM Enhanced Graphics Adaptor and the Netcomm SmartModem auto-dial facility.

Metrotel IPT

Metrotel Australasia Ltd
Level 2
88 Foveaux Street
Surry Hills, NSW 2010
tel: (02) 212 6866

LAN version of Maximo

PSDI Australia Pty Ltd (the Australian subsidiary of the US based Project Software & Development Inc) has released *Maximo LAN*, a turnkey local area network version of the Maximo Maintenance System.

Combining *Maximo* plant and facility maintenance software with LAN technology to allow multi-user access, the LAN version of *Maximo* runs on the IBM PC, and utilises 3Com Corporation's 3Server 70 file server. The server allows up to 25 *Maximo* users to create and share files and records across multiple shared levels of access.

PSDI offers *Maximo LAN* as a turnkey system that includes *Maximo* software, an IBM PC AT workstation with 640K of memory, a 1.2M floppy disk drive and color monitor, a 3Com 3Server70 with a 70M hard disk, a 60M tape back-up, 3Com communications software, the PSDI Mouse, Maximo reference manual and tutorial. Full system integration and testing as well as installation and start-up is included. Optional high speed printers and additional workstations are available.

Introduced in 1985, the Maximo Maintenance System handles corrective and preventive maintenance applications for a variety of plant/facility needs, including manufacturing, petrochemical, hospital, university, electrical and gas utilities and general building. The mouse-controlled, screen-driven system performs work order tracking, inventory control, and can be customised.

Maximo LAN

PSDI Australia
76 Betty St
North Sydney, NSW 2060
tel: (02) 923 1344

T/Master integrated software

The Computer Factory has released *T/Master*, which contains a powerful word processor, a relational database, free-form spreadsheet, bar chart graphics, and a 55,000 word spelling checker. Each part of *T/Master* is comparable in capability to single-function programs.

The company says that what makes *T/Master* a "next generation" product, is its common environment integration. There is no need to swap disks, switch modes, or change windows.

T/Master was designed to bridge the gap between new and experienced software users. A new user can operate *T/Master* entirely through menu selections and help screens and as he becomes more familiar with the program, keystrokes and commands can be used in place of the menu.

T/Master's word processor includes automatic footnoting, multiple line headers and footers, and horizontal scrolling. The "free-form" spreadsheet works like a three-dimensional calculator and the database manager allows multiple screen forms and rapid field restructuring.

Separate databases can be linked to create new ones or to generate sophisticated reports. Words may be added to the spelling checker, or specialised-use dictionaries may be created.

T/Master works with all printers, including the Hewlett-Packard LaserJet. It supports micro-dot justification on the LaserJet to provide justified proportional text in many different font styles.

T/Master Integrated 1.01 $695

The Computer Factory
214 Harbord Road
Brookvale, NSW 2100
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3Mb Multifunction for IBM-AT

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Designed especially for the IBM PC and compatibles, the Conquest effectively replaces three ordinary expansion boards – you can get a multifunction board, and Expanded Memory board, and a PCnet board all in one. Like all the other memory/multifunction boards in the Orchid family, it supports the Lotus/Intel Expanded Memory Specification with up to 2 megabytes of RAM memory. Multiple boards may be used for a total of up to 8 megabytes. A serial port, parallel port, and clock/calendar are included.

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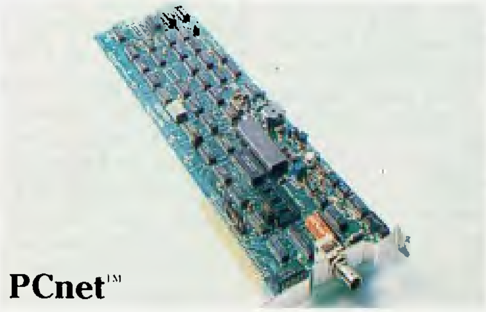

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Time In Seconds (with 4 users)	PCnet/ Advanced NetWare	3Com Etherlink	IBM PC Network
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TECH
NOTEBOOK
18

Accelerating 2.1

Robin Rodabaugh describes how the disk head settle time in DOS 2.1 can be sped up to match the faster times of DOS 1.1 and 2.0.

Different versions of DOS have different values for *head settle time.* After seeking from one track to another, disk drive heads tend to oscillate before they stabilise enough to be able to read or write data.

In DOS 1.0, the head settle time default is 25 milliseconds. For DOS 1.1 and 2.0, this default is corrected to 0, which is one reason later versions run faster than 1.0. Upon introducing half-height drive support in DOS 2.1, this default inflated to 15 milliseconds.

The patches presented below can reduce head settle time in 2.1. The FORMAT feature exhibits the most noticeable difference. A FORMAT of a double-sided, nine-sector disk normally runs 65 seconds under DOS 2.1, but with the patches it takes 41 seconds.

Tests on PC Portable show no problems using the faster parameters (the reason given for the increase in head settle time in DOS 2.1 was to accommodate the half-height drives of the Portable).

To customise DOS 2.1 so it will run at the speed of versions 1.1 and 2.0, the reset disk default parameters must be modified. They are in four places: one in the bootstrap, two in the hidden file IBMBIO.COM, and one in the FORMAT command. The bootstrap parameters are in control momentarily at boot time. The IBMBIO.COM parameters are in control most of the time. The FORMAT.COM parameters are simply placed in the bootstrap of disk that are formatted; changing FORMAT.COM is a convenient way to implement the faster parameters for all disk to be formatted in the future, without having to run DEBUG for each one.

With the patches, all disks formatted from the customised disk or hard disk will have the faster parameters. A hard disk must have a single partition. All disk drives have a finite head settle time. The implementation of these modifications may cause data to be sent to the disk drive before the drive is ready. Most applications successfully perform a retry not visible to the user. The critical value for the head settle time is 0. Changes up to 65 milliseconds do not significantly alter the time required to format a disk.

To accomplish this customisation, insert a double-sided boot disk in drive A: or a hard disk in drive C:. Use DEBUG to change the head settle time defaults, as shown below. (Comments are shown in parentheses).

These modifications cannot be made with DOS 3.1 as the bootstrap, because IBMBIO.COM and FORMAT.COM do not have the same string of instructions that reset the disk default parameters.

Robin Rodabaugh is vice president of computer services for a large life insurance company.

```
FOR BOOTSTRAP:
A>DEBUG  (Run DEBUG.)
-L 100 0 0 1 (Read in the bootstrap.)
             (If patching a hard disk, use
              "L 100 2 0 1".)
-D 100       (Confirm that location 12A contains
              0F02CD19H.)
-E 12A 00    (Change 15 milliseconds to zero.)
-D 100       (Confirm that location 12A contains 00H.)
-W 100 0 0 1 (Write out the modified bootstrap.)
             (If patching a hard disk, use
              "W 100 2 0 1".)
-Q           (Exit DEBUG.)

FOR IBMBIO.COM:
A>DEBUG      (Run DEBUG.)
-L 100 0 F 1 (Read in sector 4 of IBMBID.COM.)
             (If patching a hard disk, use
              "L 1DD 2 34 1".)
-D 100       (Confirm that location 177 contains
              0F9C1E50H.)
-E 177 00    (Change 15 milliseconds to zero.)
-D 100       (Confirm that location 177 contains
              00H.)
```

```
-W 100 0 F 1 (Write out sector 4 of IBMBIO.COM.)
             (If patching a hard disk, use
              "W 100 2 34 1".)
-L 100 0 10 1 (Read in sector 5 of IBMBIO.COM.)
              (If patching a hard disk, use
               "L 100 2 35 1".)
-D 100        (Confirm that location 154 contains
               0FABB002H.)
-E 154 00     (Change 15 milliseconds to zero.)
-D 100        (Confirm that location 154 contains
               00H.)
-W 100 0 10 1 (Write out sector 5 of IBMBIO.COM.)
              (If patching a hard disk, use
               "W 100 2 35 1".)
-Q            (Exit DEBUG.)

FOR FORMAT.COM:
A>DEBUG  (Run DEBUG.)
-N FORMAT.COM (Name FORMAT.COM as the target file.)
-L            (Read in FORMAT.COM.)
-D 1A00       (Confirm that location 1A22 contains
               0F02CD19H.)
-E 1A22 00    (Change 15 milliseconds to zero.)
-D 1A00       (Confirm that location 1A22 contains
               00H.)
-W            (Write out the modified FORMAT.COM.)
-Q            (Exit DEBUG.)
```

Debug sessions to Patch 2.1

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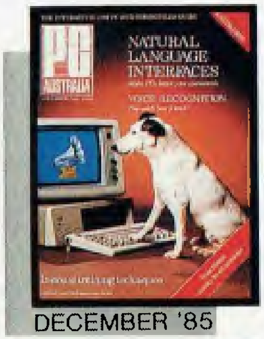
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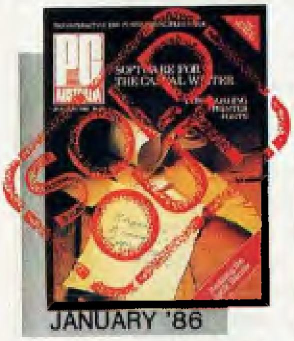
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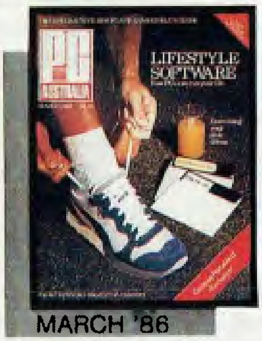
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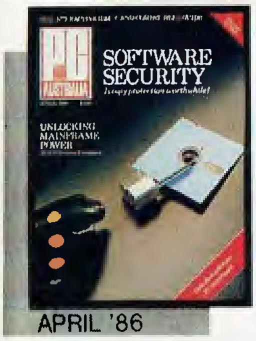
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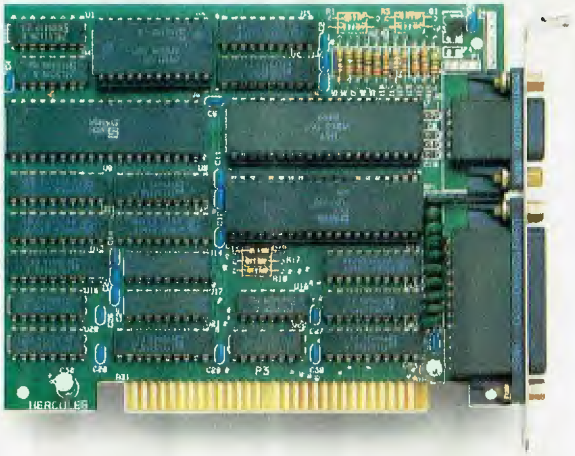

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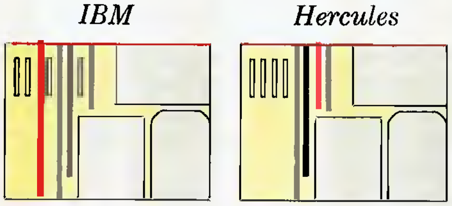

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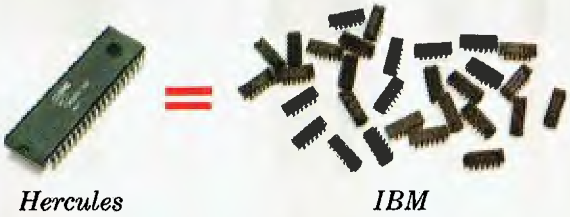

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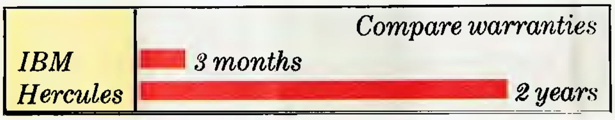

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Put the text you wish to display into several small files and have the batch file TYPE their contents at the appropriate time. This method is not only compatible between DOS versions, it is faster.

Ian Fuller

Ian is quite correct. Using the TYPE command is faster and compatible. Create your small text files quickly and efficiently using the COPY CON: <text-file-name> command.

Simple Security

I have found a rather simple way to secure data files and sub-directories from the prying eyes of casual users of my PC. I simply include in the file or directory names a number of ASCII 255 characters. Enter this character by holding down the ALT key and typing 255 on the numeric keypad. As character 255 displays as a blank space you can fool all but a few knowledgeable users, especially if you place the character on the end of a name.

Frank O'Donnell

Of course the best security is a guard with a gun. However, try this one out on someone and see how long it takes for them to crack it! (Remember that the ASCII character codes are not at all standard, especially in the 128 to 255 decimal code range. This is to say that if you have a non-IBM graphics board or compatible you may have to hunt around for an alternate character code that also displays as a blank.)

Protection Blues

Colin David's comments on how to un-protect BASIC programs (User-to-User, Feb), just like the more complete West Coast PC-SIG explanation two years ago, apparently is not helpful unless your machine has the IBM blue label on it, and IBM's proprietary ROM (including part of BASIC) inside. BLOADing his U.BAS program into address 1124 is ineffective on even a highly compatible machine like the Compaq. (In fact, David's patch caused Compaq DOS to crash on exiting from BASIC. This may be because, unlike the PC-SIG version, his program does not necessarily pass on a zero.)

All this is to say, if any PC Australia readers have an unprotect solution that does not depend on IBM's special ROM chip, I'd be most grateful to see it.

John Diller
Glebe, NSW

John is quite right! David's unprotection procedure is only for the IBM PC. After publication of that letter I was swamped with calls and letters asking for help with other implementations of BASIC on compatibles, such as the Compaq and Olivetti M24.

If you do have a scheme for unprotecting BASIC programs on a compatible please send me the details. The documentation from the West Coast PC-SIG, sent in by John, is a more correct method for achieving this. To use a corrected version of David's submission type the following:

```
BASICA
BSAVE "U", 1124, 1
LOAD "name of protected program
BLOAD "U", 1124
```

And remember, the above only works correctly for IBM BASIC or BASICA.

The return of ECHO

In reference to April's User-To-User I note Harry Barber's comments on the slight but annoying variations of the ECHO command between DOS versions 2.0 and 3.10. I have found a patch to DOS 3.10 that will fix COMMAND.COM so that ECHO followed by two spaces will produce a blank line. Make sure DEBUG and a DOS 3.10 COMMAND.COM file is on your disk and modify it as shown below.

Kevin Gates

```
DEBUG COMMAND.COM
-E 3878 83
-E 3879 F9
-E 387A 02
-E 387B 72
-W
-Q
```

There are good arguments for not putting patches into DOS. I have found no problem with this one but TAKE CARE! Also ensure you are

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Signature ....

patching a COMMAND.COM file from DOS 3.10. To activate the change you must re-boot or load a secondary command processor.

Reboot your PC

December's User-to-User contained a re-boot program for the IBM PC written in BASIC. I have a .COM file that can be created using DEBUG. This file is small, does not require BASIC to be loaded and is very quick to initiate. To create a REBOOT.COM file, simply enter the following commands which allow you to reboot your PC at any time by typing REBOOT.

Paul Palmer

```
A>DEBUG
-N REBOOT.COM
-RCX
CX 0000
:5
-E 100 EA F0 FF 00 F0
-W
Writing 0005 bytes
-Q
A>
```

This program operates on the same principle as the December submission except that we now have a .COM file to run. As both procedures jump to the reboot routine stored in ROM BIOS they are only for use on IBM PC's.

Economic batch files

If you have a lot of batch files on your system floppy or in a hard disk path directory, try DIR *.BAT to see how many bytes they occupy. The reason for such inefficient storage is that DOS writes no more than one file per block. Typical batch files are a mere fraction of block size.

At some cost in execution speed, many batch files can be combined into one with dramatic storage savings. Here's how:

```
B.BAT

ECHO OFF
CLS
REM — B.BAT, the space-saver
IF X==X%1 GOTO ENDB
SHIFT
GOTO %0
:BAT1
(copy in BAT1.BAT here)
GOTO ENDB
:BAT2
(copy in BAT2.BAT here)
GOTO ENDB
etc
:ENDB
```

B.BAT is easily created with almost any word processor. Check for conflicting duplicated labels, change calls to other batch files included in B.BAT to GOTO commands and alter codes like COMMAND/C BAT5 to COMMAND/C B BAT5. Because of the shift command there is no need to renumber %-prefixed replaceable parameters in the new file.

Now it should all work. To run BAT4, enter B BAT4. Check B.BAT for possible code improvements such as removal of redundant ECHO OFF and CLS commands and replacement of commands like GOTO END with GOTO ENDB.

For greater friendliness at the cost of lower speed, you can change ENDB in line 4 to HELP and insert a :HELP label followed by helpful ECHO commands immediately before :ENDB. This will provide a help message when B is entered without a parameter.

Alan Luchetti,
Mosman, NSW.

Alan has a great idea here. Placing all your batch files in one file may be a little impractical. However grouping several similar or related files together can give some file management and storage benefits.

Using batch files within BASIC

At times when using a BASIC program, it may be desirable to invoke a batch file. This is particularly useful when you are going to the menu type of batch file. To invoke this procedure, use the SHELL command. You will need to use DOS 2.1 or a later version as earlier versions have problems.

When using the SHELL command, include the batch file within quotes (i.e. 990 SHELL "MENU.BAT"). If this is the last line of your program, you will be taken to your MENU.BAT file. You must remember to include the filename within quotes as it will not work otherwise.

FORMAT Bell

I format all my new disks immediately after getting them and this usually takes some time because the FORMAT program prompts are usually visual. So I always have to keep on checking the screen or listening very carefully until the drive stops whirring.

I have patched FORMAT.COM so it beeps when you are prompted for a volume label, to format another disk or quit. The patch is nothing more than putting the BEL character (ASCII value 07) in the prompting text. For the DOS 2.00 FORMAT.COM, type in the following commands making sure to include all embedded spaces. (Also make sure you have another copy of FORMAT.COM — just to be on the safe side.)

Harvey Webb,
Launceston, Tas.

```
DEBUG FORMAT.COM
-E CBE
59 2F 4E 20 07
-E E67
07
-W
-Q
```

If you like bells and whistles keep watching this space! This patch has been around for a while, and refers to DOS 2.00 only — hopefully some kind soul will send in the updated version for Harvey so that he can update his DOS. As he mentions, the FORMAT.COM file has been scanned for the prompting text and a BELL character added. A similar patch for DOS 2.10 and DOS 3.10 should not be hard to produce. When you think you've got it right, send me the results.

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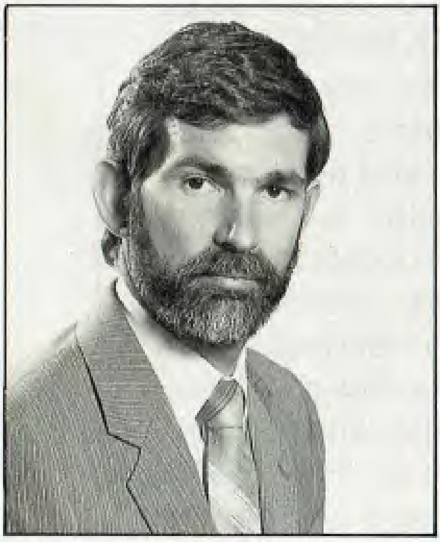
Embedded codes



Spreadsheet Clinic invites submissions from PC Australia readers. If you have any hints, tips or patches which you would like to pass on to other PC users, send them in to the following address, and the lucky authors of items published will receive a complimentary box of diskettes.

Spreadsheet Clinic
PC Australia
GPO Box 55A
Melbourne Vic 3001

There have been more letters on embedding special printer control codes in spreadsheets.

More macro characters for *1-2-3*

In the Spreadsheet Clinic in November's PC Australia (p 79), you included an item on adding the tab function to *1-2-3* macros. It involved writing a BASIC program that would write an intermediary file that could be imported into *1-2-3*.

As shown I have written a different BASIC file that adds other useful macro characters, such as Tab Left, and Printer Backspace. It also writes an intermediary file, called ASCIINEW.PRN, that contains the characters and a description of their functions. Import this file with / File Import Numbers, and you will be able to use the characters in place of macro words like {down} or {calc}.

Jonathan Weidner

The set of codes shown dramatically extend the capabilities outlined in Judith Epstein's letter (Spreadsheet Clinic, November 1985, page 79), giving access to keystrokes which 1-2-3 (Release 1) *does not provide for macros. It also introduces some interesting new capabilities. The option to replace lengthy keywords, like "(RIGHT)", with a single character enormously reduce the number of keystrokes required to define cursor movement.*

Depending on how you look at it, this also yields the advantage or disadvantage of encrypting your macros into an unreadable mess.

This method can also be used to generate the extensions to the ASCII character set which are used by the IBM PC to define graphic symbols. Once you get control of these, you can really dress up your spreadsheets with diagrams and pictures.

```
 10 LF2$ = CHR$(23)        'EDIT
 20 LF3$ = CHR$(5)         'RANGE
 30 LF4$ = CHR$(9)         'ABSOLUTE REFERENCE
 40 LF5$ = CHR$(8)         'GOTO
 50 LF6$ = CHR$(18)        'WINDOW
 60 LF7$ = CHR$(25)        'QUERY
 70 LF8$ = CHR$(24)        'TABLE
 80 LF9$ = CHR$(17)        'CALC
 90 LF10$ = CHR$(14)       'GRAPH
100 LESC$ = CHR$(12)       'ESCAPE
110 LTAB RT$ = CHR$(19)    'TAB RIGHT
120 LTAB LT$ = CHR$(20)    'TAB LEFT
130 LHOME = CHR$(16)       'HOME
140 LEND$ = CHR$(6)        'END
150 LPGUP$ = CHR$(21)      'PAGE-UP
160 LPGDN$ = CHR$(22)      'PAGE-DOWN
170 LDEL$ = CHR$(15)       'DELETE
180 LRIGHT$ = CHR$(4)      'RIGHT CURSOR
190 LLEFT$ = CHR$(3)       'LEFT CURSOR
200 LUP$ = CHR$(1)         'UP CURSOR
210 LDOWN$ = CHR$(2)       'DOWN CURSOR
220 LRETURN$ = CHR$(11)    '<RETURN>
230 LBEEP$ = CHR$(7)       'BEEP
240 LBLOCK$ = CHR$(127)    'PRINTABLE BLOCK CHARACTER, i.e. printer backspace
250 B$=CHR$(34)            'QUOTES FOR FIELD DEFINITION
260 C$=CHR$(44)            'CURSOR FOR FIELD BREAK
500 OPEN "O",#1, "ASCIINEW.PRN"
510 PRINT #1,B$+LF2$+B$+C$+B$+" f2 EDIT"+B$
520 PRINT #1,B$+LF3$+B$+C$+B$+" f3 RANGE"+B$
530 PRINT #1,B$+LF4$+B$+C$+B$+" f4 ABSOLUTE REFERENCE"+B$
540 PRINT #1,B$+LF5$+B$+C$+B$+" f5 GOTO"+B$
550 PRINT #1,B$+LF6$+B$+C$+B$+" f6 WINDOW"+B$
560 PRINT #1,B$+LF7$+B$+C$+B$+" f7 QUERY"+B$
570 PRINT #1,B$+LF8$+B$+C$+B$+" f8 TABLE"+B$
580 PRINT #1,B$+LF9$+B$+C$+B$+" f9 CALC"+B$
590 PRINT #1,B$+LF10$+B$+C$+B$+" f10 GRAPH"+B$
600 PRINT #1,B$+LESC$+B$+C$+B$+" ESCAPE"+B$
610 PRINT #1,B$+LTABRT$+B$+C$+B$+" TAB RIGHT"+B$
620 PRINT #1,B$+LTABLT$+B$+C$+B$+" TAB LEFT"+B$
630 PRINT #1,B$+LHOME$+B$+C$+B$+" HOME"+B$
640 PRINT #1,B$+LEND$+B$+C$+B$+" END"+B$
650 PRINT #1,B$+LPGUP$+B$+C$+B$+" PAGE-UP"+B$
660 PRINT #1,B$+LPGDN$+B$+C$+B$+" PAGE-DOWN"+B$
670 PRINT #1,B$+LDEL$+B$+C$+B$+" DELETE"+B$
680 PRINT #1,B$+LRIGHT$+B$+C$+B$+" RIGHT CURSOR"+B$
690 PRINT #1,B$+LLEFT$+B$+C$+B$+" LEFT CURSOR"+B$
700 PRINT #1,B$+LUP$+B$+C$+B$+" UP CURSOR"+B$
710 PRINT #1,B$+LDOWN$+B$+C$+B$+" DOWN CORSOR"+B$
720 PRINT #1,B$+LRETURN$+B$+C$+B$+" <RETURN>"+B$
730 PRINT #1,B$+LBEEP$+B$+C$+B$+" BEEP"+B$
740 PRINT #1,B$+LBLOCK$+B$+C$+B$+" BLOCK CHARACTER, i.e. printer backspace'
750 CLOSE
760 END
```

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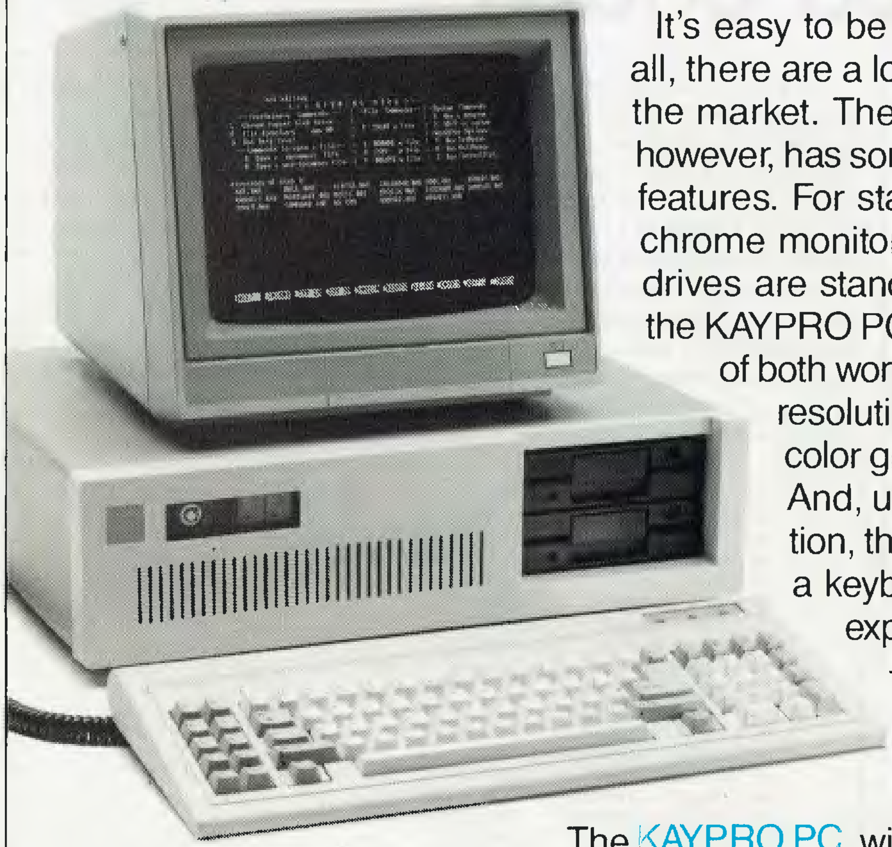

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There is a solid stamp of professionalism permeating Melbourne's PC Connection IBBS (IBM-based bulletin board system). Operating since July 14, 1984, it was the first BBS in Australia to promote the exchange of ideas and support among PC users. Lloyd Borrett got the idea of setting up a BBS in 1983 while working with BHP as PC co-ordinator.

"I was looking for a way to disseminate information among the various BHP groups around the country. I had seen the BBSs running on CP/M and the RBBS systems and I thought that was a possibility," he says. He started making enquiries in the US and tapped into some systems there and found they were a very valid source of up-to-date information on what was happening in the computer scene. When he tried to gain approval within BHP to set up a BBS system he did not receive it.

"After the Melbourne PC User Group started, I realised that a BBS system was the ideal way of putting information out and sharing it between people." he says.

There are 350 registered users, and about 100 regularly call the BBS each fortnight. There are between 40 and 50 different daily users and the average call lasts from 45 to 60 minutes. Only five to ten women are regular users. An unusual feature is the high proportion of interstate callers. Most regular users come from the business community, are end-users of information centres or dedicated 'hackers'. Borrett uses this term (in its original sense) to describe PC users who believe in sharing information, mastering programs and believe that computers can change people's lives for the better. He is not talking about the small minority who illegally enter computers.

The PC Connection system hardware is an IBM PC with a 256K motherboard, Sigma Design Maximizer board (with 348K RAM, two serial ports, parallel port, calendar clock, and games port). It has a standard IBM monochrome display and adapter, Amust RGB display and color graphics adapter, twin Teac half-height disk drives, two Seagate ST-225 half-height 20M fixed disk drives, Epson MX-100 III dot matrix printer and a Scientific Electronics XT130ADI power supply board. A Sendata 1200/300 full duplex auto-answer, auto-disconnect modem has been donated to PC Connection by Sendata Pty Ltd.

The system has separate directories for IBM files, Lotus users, and communications. BBS aficianados will revel in the lively message section packed with technical and specific messages. If you have a problem with your PC, software or communications, this is a good board to seek assistance from other users. Because there are more professional computer users on this BBS than many open systems, there is a different attitude to helping others.

Borrett predicts two interesting developments in BBSs over the next two years. "There will be a lot more of them, and the trend will develop, as in the US PC community, where they become more specialised. We'll see boards like the Philosophy BBS or the Artificial Intelligence BBS. Another trend will be towards having bigger systems with more disk storage available to the users, and yet another will be towards having multiple users," says Borrett. "That's something I'm working on. The next step is to allow multiple people to come onto the BBS and access all the files without having to maintain two or three independent systems."

When he is not working at HiSoft, an authorised IBM PC dealership and software developer based in Melbourne (where he is a marketing product specialist), Borrett escapes by taking a glider up into the wild blue yonder. As a sysop or a solo glider he always reaches for the stars. ■

PC Connection IBBS

Sysop: Lloyd Borrett
Phone number: (03) 528 3750
Hours of operation: 24 hours
Baud rates: 300 full duplex, 1200 full duplex
Protocol: 8 data bits, 1 stop bit, no parity
Access: Closed system (visitors 30 minutes only)
Registration: MELB-PC members $10, others $15. Cheques payable to PC Connection IBBS GPO Box 486G, Melbourne, Vic 3001 (Patience required, mine took two months!)
Password: Password mailed to registered users.
Time limit: 120 minutes per day (registered users). All calls which start during Prime Time period (6pm to midnight) have two minutes charged for each real minute connected. No visitor access during Prime Time.
Files for downloading: Over 430, mainly for IBM PC and compatibles.
Comments: Staggering array of useful programs for downloading means that everyone should get value for money.
Software used: Modified IBBS program, very user friendly.

Bulletin board

PC User Groups

MELB-PC
Contact: Garry Bryant (03) 615 4844
Time: 6.00pm first Wednesday
Venue: Clunies Ross House
191 Royal Parade
Melbourne

Sydney PC User Group
Contact: Catherine Rosenbrauer
(02) 29 7033
Time: 5.45pm third Monday
Venue: Esso Auditorium
35 Clarence Street
Sydney

Perth PC Micro Users Group
Contact: Peter Goodwin (09) 274 5911
Time: 5.30pm first Tuesday
Venue: Royal Kings Park Tennis Club
Kings Park Road, West Perth

Adelaide PC Users Group
Contact: John Roberts (08) 212 5020
Time: 7.45pm second Thursday
Venue: 195 Gilles Street

PC Users Group Inc. (ACT)
Contact: Chess Krawczyk
(062) 80 5954
Time: 8.00pm final Monday
Venue: Coombes Lecture Theatre
Australian National University

Brisbane 16-Bit Users Group (BRISBUG)
Contact: Roy Willie (07) 393 3388
Time: 2.00pm third Sunday
Venue: Toowong State High School
Bywong Street, Toowong

The New England PC User Group is being formed in Armidale at the University of New England. Contact Brian Hardaker, (067) 73 2195.

BBS Directory

Victoria	
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HiSoft IBBS	(03) 799 2001
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Down Under	(03) 429 5819
New South Wales	
PC Exchange	(062) 58 1406
PC User Group	(02) 238 9034
Micro Design Lab	(02) 663 0150
Sydney Public Access	(02) 808 3536
Prophet RBBS	(02) 628 7030
Dick Smith IBBS	(02) 887 2276
Tandy BBS	(02) 625 8071
South Australia	
Adelaide User Group	(08) 271 2043
Computer Ventures	(08) 255 9146
Queensland	
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Western Australia	
Perth PC Users BBS	(09) 227 9229

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Multiplan Users Group
Address: PO Box 95, Forestville, NSW 2087.
Contact: Richard Womack (02) 997 1554.
Meetings: 6.15pm 2nd Wednesday, MTE Centre, 2nd Floor, Cnr York and Market Streets, Sydney.

dBase Users Group (includes Framework SIG)
Address: ACS, 72 Pitt St, Sydney 2000
Contact: Catherine Rosenbrauer (02) 74 1961
Meetings: 6.30pm 3rd Tuesday, ACS, 1st Floor, 72 Pitt St, Sydney

Spellbinder User Group
Contact: Kathie Hanson. Meetings: 6.00pm fourth Monday, Room 9, Trades Hall, Cnr Dixon and Goulburn Sts, Haymarket, NSW 2000.

NOTICE

If you have any further PC community information for this bulletin board, Contact the Editor, Ian Robinson on (03) 6024122

SPECIAL INTEREST GROUPS

The PC User Group in Sydney has spawned a number of special interest groups (SIGs) which meet at varying times throughout the month.

ComSIG — 5.45pm second Monday, ACS, 1st Floor, 72 Pitt St. Contact Geoff May (02) 699 3518.

BusinessSIG — 5.45pm fourth Tuesday, Peat Marwick, 31st Floor Australia Square, Pitt St. Contact John Pitera (02) 499 2400.

CHUSIG (Challenger PCs) — 5.45pm 2nd Tuesday, 4th Floor, 80 Arthur St, North Sydney. Contact Geoff Townes.

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Turbo Pascal User Groups

Victoria
Address: PO Box 81
East Caulfield Vic. 3145
Contact: Ron Savage (03) 651 1414
Meetings: 7.00pm 1st Wednesday
Institute Function Room
Union Building, RMIT

Western Australia
Address: 73 Outram Street
West Perth WA 6005
Contact: Aaron Regan (09) 322 1834
Meetings: 7.30pm 2nd Tuesday
2/294 Rokeby Road Subiaco

Lotus User Groups

Melbourne
Contact: Robert Taylor (03) 267 4800
Time: 5.30pm first Tuesday
Venue: Light Car Club, 46 Queens Rd

Sydney
Contact: Ron Pollak (02) 290 3655
Time: 5.45pm first Tuesday
Venue: National Bank, 12th Floor, 343 George St

Perth
Contact: Peter Foreman (09) 426 4730
Time: 5.30pm second Wednesday
Venue: KMG Hungerford, 9th Floor, 190 St George's Tce, or Citicorp, 1011 Hay St

Adelaide
Contact: Paul Wragg (08) 223 5711
Time: 7.30pm first Tuesday
Venue: 173 Wakefield St

Brisbane
Contact: Bill Savage (07) 221 2144
Time: 5.30pm first Tuesday
Venue: Duesbury's, 28th Floor, 239 George St

Newcastle
Contact: Louis Lee (049) 26 8692
Time: 5.35pm first Thursday
Venue: Newcastle Gas Company, 623 Hunter St

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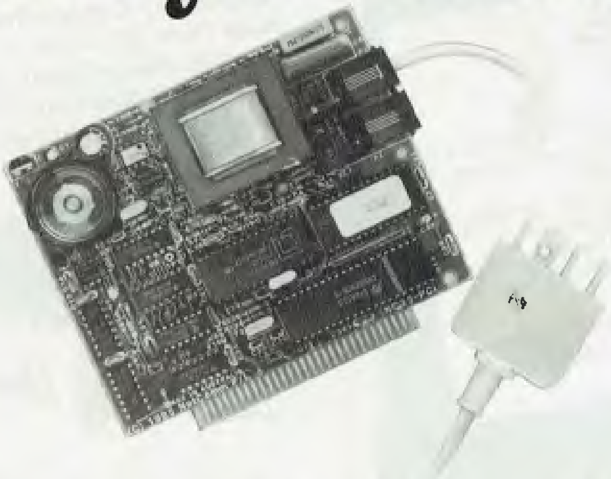

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NE18FPC

PC Australia goes public

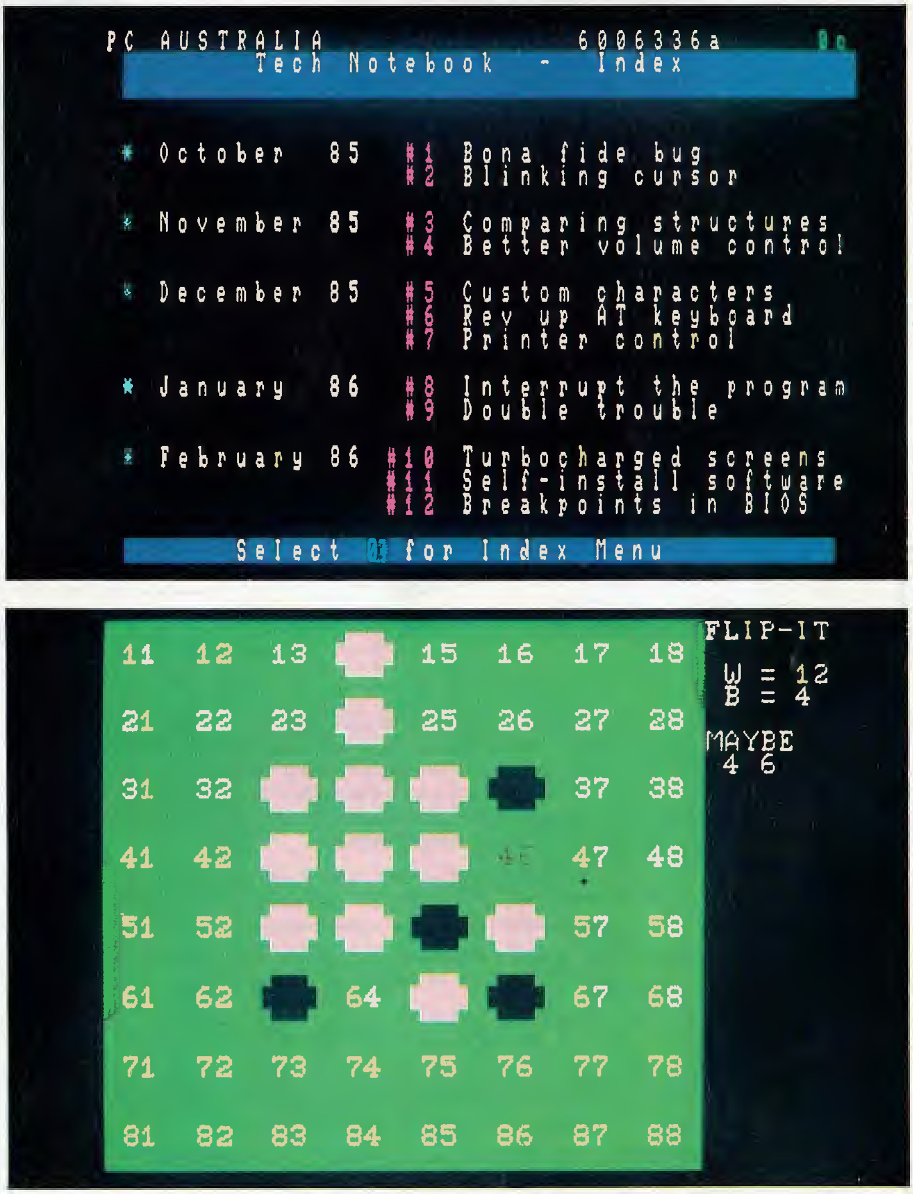
Pioneering *PC Australia* bulletin board users will by now be aware that the entire system has been transported to Viatel. The videotex-based bulletin board initially ran on the editor's hard-working PC XT, using PC-Display host software (from Syscorp Microsystems) and a single dedicated telephone line with a trusty NetComm In/Modem.

However, as the system grew in popularity the single line was inevitably jammed with callers and the majority of calls ended with the engaged tone. This was the main reason for accelerating moves to get the entire bulletin board onto Viatel, where readers can access it simultaneously. Furthermore, it costs the same regardless of whether you live in Toorak, Double Bay, Dalkeith, Parramatta or Alice Springs.

If you were one of the original bulletin board users, or if you sent in a password application and did not receive an explanatory note about the bulletin board's new address, then take note — passwords are no longer necessary! In other words, the *PC Australia* bulletin board is not a closed user group (CUG) facility on Viatel. Instead, anyone can access it and as *PC Australia* readers are the only ones to have so far been told of its existence, this should not prove too much of a problem.

To find the *PC Australia* bulletin board on Viatel, simply jump to page number *60063# — the main menu page — where you will be greeted by the familiar red *PC Australia* logo. Four options are supported (PC News, Services, Index and What's On), but this will grow as time passes.

A detailed inspection of the bulletin board will show that much fine-tuning is still required, particularly in the magazine index section, but please bear with us, as all videotex frames are being created (and updated) in *PC Australia*'s office, on the same hard-working PC XT.



```
PC AUSTRALIA                  6006336a      0c
          Tech Notebook   -   Index

 * October   85   #1  Bona fide bug
                  #2  Blinking cursor

 * November  85   #3  Comparing structures
                  #4  Better volume control

 * December  85   #5  Custom characters
                  #6  Rev up AT keyboard
                  #7  Printer control

 * January   86   #8  Interrupt the program
                  #9  Double trouble

 * February  86  #10  Turbocharged screens
                 #11  Self-install software
                 #12  Breakpoints in BIOS

        Select 0 for Index Menu
```

```
11  12  13      15  16  17  18   FLIP-IT
                                  W = 12
21  22  23      25  26  27  28    B = 4
                                 MAYBE
31  32                  37  38    4 6

41  42              46  47  48

51  52                  57  58

61  62      64          67  68

71  72  73  74  75  76  77  78

81  82  83  84  85  86  87  88
```

Frames from PC Australia's *bulletin board*

The more business-minded Viatel users will have relised that the *PC Australia* bulletin board number is a branch from the popular *600# node used by Money Watch — currently the most heavily-accessed service on Viatel. Furthermore, once you have completed your enquiries on the bulletin board, you return through the main Money Watch menu. Given that the vast majority of *PC Australia* readers use their PCs specifically for business purposes, this pathway seems most appropriate. Eventually the connection will become bi-directional, and the *PC Australia* bulletin board will be publicised as an additional service from the Money Watch main index. ■

Can't decide ?

olivetti

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Now that the NEC APCIII boasts a Software Library Expander (making it compatible with industry standard software) we wouldn't be surprised if you're finding it hard to choose between this machine and the No. 2 seller, the Olivetti/A.T. & T. PC. Just to make it harder, A.T.S. COMPUTING increases the normal 6 month warranty on the Olivetti/A.T. & T. P.C. to a full 12 months, matching that on the NEC APCIII. And we'll better any genuine quote from any competitor in Australia on Olivetti, NEC, Brother and Toshiba computer products. Below are just a few examples of the many packages we can tailor to meet your needs — if you only want a computer, let's just say our prices are unpublishable!

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OLIVETTI M24 dual 360K floppy system with 640K RAM, mono.monitor and keyboard plus free A.T.S. word processing and S.B.A. software (as above) PLUS N.L.Q. PRINTER all for just $3,995 including sales tax.

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Coming up

Videotex 86, an exhibition and conference focusing on the current and future directions of videotex in Australia, will be held in Sydney in early July and to coincide with this, *PC Australia's* July issue will feature PC videotex.

Widely accepted as having Australia's leading coverage of videotex and dial-up services, *PC Australia* intends to build on this reputation and cover the latest developments in detail. *PC Australia* was a pioneer among computer publications in establishing its presence on Viatel, Australia's public videotex system.

Watch out also for another compatible review from **Clive Lassiter**, spreadsheet hints from **John Green**, general tips from **Stephen Murray**, witty comments from **Les Stein** and **Ian Robinson** and another bulletin board sysop profile from **Robin Howells**. Stay tuned!

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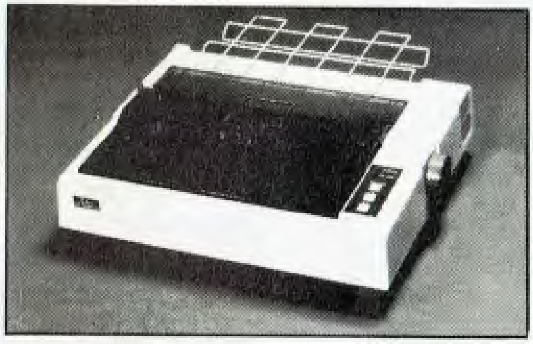

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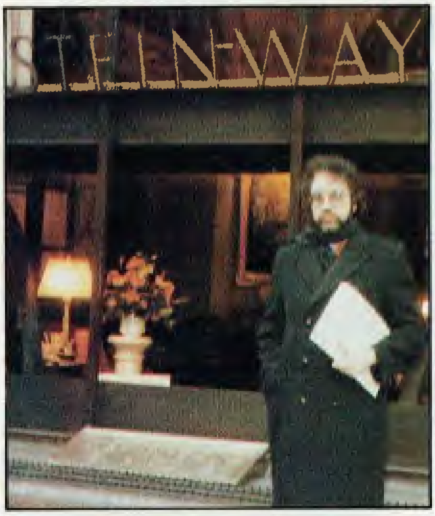

Time to add a few cents to the perennial computer conundrum — should you upgrade to an AT, spruce up your trusty PC or get a laptop? The road to enlightenment lies not in examining economies of scale but rather looking deep within your motives.

I am in the psychological 'gimme' category. I have yet to find a way to defer gratification. Lack of money has never stopped me swapping an increased debt for a new trinket. I identify more with Hollywood than a quiet life in the Gibson Desert. I must have the latest novelty like a devout person craves salvation.

When I hear of a new power product I have a vision of how nice it will look on my desk, how the screen images will flutter by and how, at last, I can be at peace with the ultimate installation. At that moment, my present equipment looks tawdry and fragile. I notice all the crumbs in the keyboard, how the fan sounds tired and that the monitor has lost its clarity.

Usually, there is initial hesitation after the first vision. But then I hear someone else has a new whatever, or maybe I read a review that shows a 300 per cent speed increase in a new machine, or which says things like "even old *WordStar* flies across the screen". After about six months of this, my wallet begins to itch.

I then have little talks with myself. "Okay big boy — you don't have three grand to spend at the moment but why not stick it on Bankcard and you won't notice it. Increased speed means more bucks in the long run and let's face it — you could die tomorrow." I have never actually heard a voice to the contrary — this must be the true sound of my soul. There is no longer a question of if — only when.

How about you? Only have some puny limited memory and speed? Are you a little toddler user barely nudging 256K? Have to ask your spouse permission to buy a single floppy? Using some pathetic clone with some nonsense name like PC BUDDY. Bit fed up when it takes an interminable time to format a disk?

We all seem deaf to Goethe's words: "How strange that he who cleaves to shallow things, can keep his hopes alive on empty terms and dig with greed for precious plunderings and find such happiness unearthing worms."

I have wasted thousands of dollars. I don't need a hard disk. I only use three or four programs consistently and can keep everything on half a dozen floppies. I have no use for 2M of internal memory — only once have I reached 640K. A 300 per cent speed difference in my word processor? I did fine with a Kaypro for years — so what if it takes three seconds longer to jump to the end of a document?

The computer gurus say that if what you have will do the job, that is enough. You may need a hard disk but it should amount to more than a preference; it must be a necessity. The same goes for increased speed and any of the new-fangled software.

We have all heard this lament before. What you have is good enough — be happy and thankful — technology changes so fast that it is best to wait for a new blockbuster rather than just add on another Band-Aid. What you buy today will be outmoded tomorrow, and so on and so on.

Go and look in the mirror. How do you look? Skin getting a bit loose around the chin — a wrinkle here and there — eyes like roadmaps of Sydney — a bit stooped and tired? Think you have much time left?

Go ahead, buy all the new stuff while you can. What could be nicer than more toys, some nice shiny boxes like Christmas presents. Use your Bankcard and charge more than you can afford. They don't shoot you if you're a bit late.

I have no idea if computers are good or bad for society. Sometimes it looks one way, other times it look another way. It matters little if an AT will give you extra dollars in the bank. What does matter is that you seize the moment and enjoy yourself. Play now — die later. ■

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